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**Literature search results**

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**Search details**

Refractory anaemia in pregnancy

**Resources searched**

NHS Evidence; TRIP Database; Cochrane Library; AMED; BNI; CINAHL; EMBASE; HMIC; MEDLINE; PsychINFO; Google Scholar

**Database search terms**: “refractory anaemia”; “refractory anemia”; RA; RAEB; pregnan*; PREGNANCY; gestation; gravid*; “child bearing”; “child-bearing”; childbearing; RARS; RAEB-1; RAEB-2; RAEB-t; “acute myelogenous leukemia”; “acute myelogenous leukaemia”; “myelodysplastic syndrome”; exp MYELODYSPLASTIC SYNDROMES; labor; labour; delivery; maternal; maternity; prenatal; antenatal; exp CHILDBIRTH; exp DELIVERY; severe adj0 (anaemia OR anemia); ANEMIA; “grade 3”; “grade 4”; severe

**Google search string**: (anemia OR anaemia OR RARS OR RAEB) (severe OR refractory OR "grade 3" OR "grade 4") (pregnant OR pregnancy)

**Summary**

I have concentrated on severe and refractory anaemia as indicated by the search terms included above. I have not looked for specific forms of severe anaemia. If you require a search for specific forms, please let me know.

**Guidelines**

American College of Obstetricians and Gynecologists

Anemia in pregnancy 2008

British Committee for Standards in Haematology
Iron deficiency may contribute to maternal morbidity through effects on immune function with increased susceptibility or severity of infections (Eliz et al, 2005), poor work capacity and performance (Haas et al, 2001) and disturbances of postpartum cognition and emotions (Beard et al, 2005). There is little information regarding the Hb thresholds below which mortality increases, although this may be as high as 8.9g/dl, which was associated with a doubling of the maternal death risk in Britain in a 1958 study (Brabin et al, 2001). However severe anaemia is likely to have multiple causes and the direct effect of the anaemia itself is unclear.

Guidelines for the estimation of fetomaternal haemorrhage 2009
Severe anaemia at birth may also warrant looking for occult FMH if the anaemia is otherwise unexplained.

Guidelines for the diagnosis and management of aplastic anaemia 2009
1. Allogeneic BMT from a human leucocyte antigen (HLA)-identical sibling donor is the initial treatment of choice for newly diagnosed patients if they have severe or very severe aplastic anaemia, are <40 years old and have an HLA-compatible sibling donor.
2. MMF appears to be ineffective in the treatment of patients with refractory aplastic anaemia.
3. There is a high risk (around 33%) of relapse of aplastic anaemia in pregnancy. Supportive care is the mainstay of treatment in pregnancy and the platelet count should be maintained >20 · 10^9/l, if possible. It is safe to use ciclosporin in pregnancy.
4. See also section 11. Management of aplastic anaemia in pregnancy

Map of Medicine
Iron deficiency anaemia (IDA) 2011

NICE
TA156 Pregnancy (rhesus negative women) - routine anti-D (review): guidance 2008
Severe anaemia can lead to fetal heart failure, fluid retention and swelling (hydrops), and intrauterine death.

Evidence-based reviews

Cochrane Database of Systematic Reviews
Treatments for iron-deficiency anaemia in pregnancy 2012
Despite the high incidence and burden of disease associated with this condition, there is a paucity of good quality trials assessing clinical maternal and neonatal effects of iron administration in women with anaemia. Daily oral iron treatment improves haematological indices but causes frequent gastrointestinal adverse effects. Parenteral (intramuscular and intravenous) iron enhances haematological response, compared with oral iron, but there are concerns about possible important adverse effects (for intravenous treatment venous thrombosis and allergic reactions and for intramuscular treatment important pain, discolouration and allergic reactions). Large, good quality trials, assessing clinical outcomes (including adverse effects) as well as the effects of treatment by severity of anaemia are required.

UK Clinical Trials Gateway
Comparison Study of Standard Care Against Combination of Growth Factors Agents for Low-risk MDS 2010
REGiM: Prolonged treatment with darbepoetin alpha (EPO), with/without recombinant human granulocyte colony stimulating factor (G-CSF), versus best supportive care in...
patients with low-risk myelodysplastic syndromes (MDS) 2010

REGiME Trial: Prolonged treatment with darbepoetin alpha (DA) in patients with low-risk myelodysplastic syndromes 2010

Safety and efficacy of subcutaneous HMR4396 for the management of anaemia in subjects with chronic renal failure (predialysis, haemodialysis, peritoneal dialysis) 2007

Subcutaneous Alemtuzumab (CAMPATH®, MabCampath®) in Relapsed/Refractory B-Cell Chronic Lymphocytic Leukemia 2006

Published research

1. Evaluation and Management of Lymphoma and Leukemia in Pregnancy.
   Author(s): Cohen, Jonathon B., Blum, Kristie A.
   Citation: Clinical Obstetrics & Gynecology, 01 December 2011, vol./is. 54/4(556-566), 00099201
   Publication Date: 01 December 2011
   Source: CINAHL
   Full Text:
   Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.
   Available in fulltext at the ULHT Library and Knowledge Services’ eJournal collection

2. Successful pregnancy after Busulfan/cytoxan conditioning regimen for AML
   Author(s): Shah A.J.
   Citation: Journal of Pediatric Hematology/Oncology, July 2011, vol./is. 33/5(e180-e181), 1077-4114;1536-3678 (July 2011)
   Publication Date: July 2011
   Abstract: The number of patients who have had successful pregnancies following hematopoietic stem cell transplant during childhood remains under investigation. As the number of survivors increase and enter adulthood, we continue to learn more about fertility in these patients. In this case report we report the case of a 27 year-old female who had a normal full term delivery 19 years following a myeloablative autologous transplant for relapsed acute myelogenous leukemia. Copyright 2011 by Lippincott Williams & Wilkins.
   Source: EMBASE
   Full Text:
   Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

3. Next-generation sequencing technology combined with multiplexed barcoded samples of myelodysplastic syndromes reveals an abundance of target gene mutations
   Author(s): Nagata Y., Sanada M., Yoshida K., Mori H., Shih L.-Y., Koeffler H.P., Ogawa S.
   Citation: Leukemia Research, May 2011, vol./is. 35/(S17), 0145-2126 (May 2011)
   Publication Date: May 2011
   Abstract: Myelodysplastic syndromes (MDS) are a highly heterogeneous group of myeloid neoplasms characterized by ineffective hematopoiesis and a predisposition to acute myeloid leukemia, in which a model of multistep oncogenesis has been implicated in their pathogenesis. In fact, a number of gene mutations have been shown to be involved in MDS during the past 30 years. On the other hand, the entire profiles of multiple gene mutations with their relationship with WHO classification, chromosomal alterations, and clinical pictures, have not been fully explored in a large series of MDS cases, because mutation
screening of all MDS-related genes in a large number of samples using Sanger sequencing has been a time-consuming and labor-intensive task. So in order to overcome this issue and to obtain comprehensive pictures of gene mutations in MDS and related neoplasms, we performed high throughput mutation analyses using Illumina-based next-generation resequencing technology combined with target gene capture and barcode labeling of multiple DNA samples. Briefly, the target sequences enriched by using the SureSelect system were primed with 6-base barcode sequences to discriminate the sample, and were subjected to high-throughput resequencing using Genome Analyzer IIx (Illumina). In total, 1,467 exons from 85 known or putative gene targets were analyzed in 170 cases with MDS or related myeloid neoplasms, where 93% of the target regions were sequenced with >20x depth on average. We identified a total of 342 mutations in 64 genes, which included mutations not only of known target genes, such as RAS (13%), TET2 (14%), TP53 (7%), RUNX1 (10%), IDH1/2 (9%), FLT3 (2%), ASXL1 (8%), EZH2 (6%) and c-CBL (6%), but also of previously unreported gene targets, such as NOTCH2 (4%) and PHF6 (4%). Some mutations were tightly associated with copy number alterations in particular chromosomal segments. In agreement with multi-step oncogenesis, 2 (0-15) mutations were identified in a single case on average, especially 94 samples (55%) having more than two mutations. Typically, mutations tended to affect multiple gene pathways, involving the signal transduction (36%), chromatin/histone modification (26%), cell cycle (5%) and transcription (29%). The genes on the signal transduction pathway were more frequently mutated in chronic myelomonocytic leukemia, whereas those involved in transcription were more predominant in secondary acute myeloid leukemia. In conclusion, highly paralleled resequencing of target-captured and barcode-labeled gene targets was a powerful approach to disclosing the genetic basis of MDS and related myeloid neoplasms.

Source: EMBASE

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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

4. Prevalence of anaemia in pregnant women during the last trimester: consequence for birth weight.

Author(s): Demmouche A, Lazrag A, Moulessehoul S

Citation: European Review for Medical & Pharmacological Sciences, April 2011, vol./is. 15/4(436-45), 1128-3602;1128-3602 (2011 Apr)

Publication Date: April 2011

Abstract: OBJECTIVES: Iron deficiency continues to be one of the most prevalent single-nutrient deficiencies in the world. The current study aimed to estimate the prevalence of iron deficiency anemia (IDA) among pregnant women who attend Antenatal Care Centers in Sidi Bel Abbes, Algeria. The effect of anaemia on infant birth weight was also examined.MATERIALS AND METHODS: The study was conducted during the period March-Mai, 2010 and the sample consisted of 207 pregnant women (in the third trimesters) in the age group (17-41) years. The subjects were not taking iron, folate or vitamin B12 supplements at the time of the study. Blood samples were collected from each pregnant woman and a questionnaire was completed at the time of blood collection. A series of determinations was conducted to determine hemoglobin concentration (Hb); packed cell volume (PCV); corpuscular hemoglobin concentration (MCHC), corpuscular volume (MCV). The effect of anemia on the weight of new born babies was examined by calculating the correlation coefficient of birth weight and hematological indexes.RESULTS: The overall prevalence of anemia was found to be 46.86%. According to the severity anemia was 36.08% mild, 49.48% moderate and 14.43% severe anemia. The mean values (±/ SD) of haematological indexes were as follows: Hb 9.00 +/- 1.57 g/dl; PCV 27 +/- 5.37%; mean corpuscular haemoglobin concentration (MCHC) 33.75 +/- 2.69 g/dl and mean corpuscular volume (MCV) 75.7 +/- 10.4 fl. The results have shown that 46.39% of the subjects had MCV values less than standard value of 75 fl suggesting a microcytic anemia. The mean haemoglobin concentration was 9 +/- 1.57 g/dl while the mean birth weight was 3201.54 +/- 566.71 g. There was a not significant correlation between the Hb level and the birth weight of the infants (r = 0.28, p > 0.05). The prevalence of low birth weight was 9.2%. There was no statistically significant haemoglobin concentration /foetal birth weight difference among the various hemoglobin concentration (Chi square test = 0.34, p > 0.05).CONCLUSIONS:
Anemia had no significant obstetric adverse effects in our pregnant population (Fischer test = 0.06, p > 0.05). There was no statistically significant difference in mean birth weight among the various haemoglobin groups suggesting that other parameters may play important roles in influencing the birth weight than the maternal haemoglobin concentration.

Source: MEDLINE

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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

5. Effect of routine iron supplementation with or without folic acid on anemia during pregnancy.

Author(s): Yakoob MY, Bhutta ZA

Citation: BMC Public Health, 2011, vol./is. 11 Suppl 3/(S21), 1471-2458;1471-2458 (2011)

Publication Date: 2011

Abstract: INTRODUCTION: Iron deficiency is the most prevalent nutrient deficiency in the world, particularly during pregnancy. According to the literature, anemia, particularly severe anemia, is associated with increased risk of maternal mortality. It also puts mothers at risk of multiple perinatal complications. Numerous studies in the past have evaluated the impact of supplementation with iron and iron-folate but data regarding the efficacy and quality of evidence of these interventions are lacking. This article aims to address the impact of iron with and without folate supplementation on maternal anemia and provides outcome specific quality according to the Child Health Epidemiology Reference Group (CHERG) guidelines.

METHODS: We conducted a systematic review of published randomized and quasi-randomized trials on PubMed and the Cochrane Library as per the CHERG guidelines. The studies selected employed daily supplementation of iron with or without folate compared with no intervention/placebo, and also compared intermittent supplementation with the daily regimen. The studies were abstracted and graded according to study design, limitations, intervention specifics and outcome effects. CHERG rules were then applied to evaluate the impact of these interventions on iron deficiency anemia during pregnancy. Recommendations were made for the Lives Saved Tool (LiST).

RESULTS: After screening 3550 titles, 31 studies were selected for assessment using CHERG criteria. Daily iron supplementation resulted in 73% reduction in the incidence of anemia at term (RR = 0.27; 95% CI: 0.17 - 0.42; random effects model) and 67% reduction in iron deficiency anemia at term (RR = 0.33; 95% CI: 0.16 - 0.69; random model) compared to no intervention/placebo. For this intervention, both these outcomes were graded as 'moderate' quality evidence. Daily supplementation with iron-folate was associated with 73% reduction in anemia at term (RR = 0.27; 95% CI: 0.12 - 0.56; random model) with a quality grade of 'moderate'. The effect of the same intervention on iron deficiency anemia was non-significant (RR = 0.43; 95% CI: 0.17 - 1.09; random model) and was graded as 'low' quality evidence. There was no difference in rates of anemia at term with intermittent iron-folate vs. daily iron-folate supplementation (RR = 1.61; 95% CI: 0.82 -3.14; random model).

CONCLUSION: Applying the CHERG rules, we recommend a 73% reduction in anemia at term with daily iron (alone) supplementation or iron/folate (combined) vs. no intervention or placebo; for inclusion in the LiST model. Given the paucity of studies of intermittent iron or iron-folate supplementation, especially in developing countries, we recommend further evaluation of this intervention in comparison with daily supplementation regimen.

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Available in fulltext at BioMedCentral
Available in fulltext at National Library of Medicine

6. [Acute myelogenous leukemia developed at the 26th week of gestation]
6


Citation: [Rinsho ketsueki] The Japanese journal of clinical hematology, January 2011, vol./is. 52/1(18-22), 0485-1439 (Jan 2011)

Publication Date: January 2011

Abstract: We report here a 35-year-old pregnant woman with acute myelogenous leukemia (AML). She was diagnosed with AML (M2) in August 2009, coinciding with the 26(th) week of pregnancy. She underwent a cesarean section at 27 weeks gestation, delivering a very low birth weight male infant (1,066 g). One week later, she received induction chemotherapy with idarubicin and cytarabine. She achieved complete remission after two courses of chemotherapy. The incidence of acute leukemia during pregnancy is low. Chemotherapy after the 2(nd) trimester is not associated with an increased rate of fetal malformation. However, there are some reports that in utero exposure to chemotherapy during any trimester of pregnancy carries a significant risk for an unfavorable outcome including low birth weight, fetal or neonatal death, and intrauterine growth retardation. Decision on the choice of treatment for acute leukemia during pregnancy should be case-dependent. If an infant has grown sufficiently to be viable outside uterus and the patient does not demonstrate a severe bleeding tendency, delivery by cesarean section preceding chemotherapy is one option.

Source: EMBASE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

7. Clinical profile of women with severe anaemia in the third trimester of pregnancy.

Author(s): Patra S, Puri M, Trivedi SS, Pasrija S

Citation: Tropical Doctor, April 2010, vol./is. 40/2(85-6), 0049-4755;1758-1133 (2010 Apr)

Publication Date: April 2010

Abstract: Anaemia, the most common medical disorder associated with pregnancy, is a silent killer. Most severely anaemic pregnant women are asymptomatic and present late in the third trimester with medical and obstetric complications.

Source: MEDLINE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

8. Pregnancy in a woman with polycystic ovary syndrome and myelodysplastic syndrome (in the form of refractory anemia) treated with allogeneic hemopoietic stem-cell transplantation (alloHSCT)

Author(s): Usnarska-Zubkiewicz L., Bolanowski M., Zubkiewicz-Kucharska A., Podolak-Dawidziak M., Kuliczkowski K.

Citation: Gynecological Endocrinology, February 2010, vol./is. 26/2(135-138), 0951-3590;1473-0766 (February 2010)

Publication Date: February 2010

Abstract: The case of a 21-year-old patient is presented who was diagnosed simultaneously with myelodysplastic syndrome (MDS) in the form of refractory anemia and hormonal disturbances consistent with polycystic ovary syndrome (PCOS). The patient became pregnant 28 months after megachemotherapy and alloHSCT and delivered a healthy son. The patient's fertility was jeopardized due to both hormonal disturbances and megachemotherapy with cyclophosphamide and allogeneic transplantation; however, her age and body mass reduction in the peritransplant period were beneficial factors. Despite an autologous reconstitution after megachemotherapy and alloHSCT, the malignant neoplastic clone was eliminated and 5 years after transplant the patient remains free from
the symptoms of MDS. Two years after the delivery her hormonal findings, including testosterone level, are within the norm, but menstrual bleeding remains irregular and there was a relapse of obesity. To the authors' knowledge, this is the first known case of pregnancy in a patient suffering from MDS and PCOS after HSCT from a sibling donor. 2010 Informa UK Ltd.

Source: EMBASE

Full Text:
Available in fulltext at EBSCOhost.
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.


Author(s): Rizack T, Mega A, Legare R, Castillo J

Citation: American Journal of Hematology, December 2009, vol./is. 84/12(830-41), 0361-8609;1096-8652 (2009 Dec)

Publication Date: December 2009

Abstract: The management of hematological malignancies during pregnancy is a challenging endeavor, which not only requires technical skills and knowledge by the clinicians but also requires sound clinical judgment and compassion, keeping in mind the patient and family preferences and, ultimately, the wellbeing of the neonate. The incidence of hematological malignancies during pregnancy is rare, ranging from 1 in 1,000 to 1 in 10,000 deliveries, impeding the design and execution of large prospective studies. The purpose of this review is to evaluate the limited existing data and make useful suggestions in the management of acute and chronic leukemias, Hodgkin and non-Hodgkin lymphomas, plasma cell myeloma, and other hematological malignancies, such as myelodysplastic syndromes and hairy cell leukemia, during pregnancy. (c) 2009 Wiley-Liss, Inc.

Source: MEDLINE

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10. Diagnosis and treatment of maternal acute myeloid leukemia during pregnancy imitating HELLP syndrome.

Author(s): Biener DM, Gossing G, Kuehnl A, Cremer M, Dudenhausen JW

Citation: Journal of Perinatal Medicine, 01 November 2009, vol./is. 37/6(713-714), 03005577

Publication Date: 01 November 2009

Source: CINAHL

Full Text:
Available in fulltext at EBSCOhost.
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

11. Outcome of severely anaemic fetuses treated by intrauterine transfusions.

Author(s): Weisz B, Rosenbaum O, Chayen B, Peltz R, Feldman B, Lipitz S

Citation: Archives of Disease in Childhood Fetal & Neonatal Edition, May 2009, vol./is. 94/3(F201-4), 1359-2998;1468-2052 (2009 May)

Publication Date: May 2009

Abstract: BACKGROUND: Fetal anaemia is a well-known complication of pregnancy, which might have an ominous effect on the course of pregnancy, labour and the child's development.OBJECTIVE: To assess the effect of the severity of fetal anaemia on the
METHODS: A retrospective cohort study. Pregnancies treated by intrauterine transfusions for fetal anaemia at Sheba Medical Center (1996-2004) were divided into two groups: mild to moderate anaemia (fetal haematocrit >0.50 multiples of the median (MoM)) and severe anaemia (hydrops fetalis or fetal haematocrit < or =0.50 MoM). Data were retrieved from relevant obstetric and fetal medicine files.

RESULTS: During the study period, 54 fetuses were treated by 154 (median 3; range 1-7) intrauterine transfusions for red cell alloimmunisation. The sensitising antigen was D in 70% of cases; 18/54 patients were sensitised to more than one antigen. Thirty-three of the 54 fetuses (61%) were in the severely anaemic category (haematocrit range 3-20%); six were hydropic. Twenty-one of the 54 fetuses (39%) were in the mild-moderate anaemic category (haematocrit range 20-37%). On prenatal evaluation, there were no sonographic markers of central nervous system abnormalities or intraventricular haemorrhage. There were no differences in the neonatal outcome between the two groups. Developmental outcome was available in 14/18 (78%) mild-moderate cases and 26/29 (89%) severe cases. There were no significant differences in motor development score, percentage of abnormal cognitive development, and percentage of children needing supportive therapy between the mild-moderate and severe cases.

CONCLUSION: Neonatal and developmental outcome of fetuses treated for severe anaemia is comparable to cases of mild anaemia.

Source: MEDLINE

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Available in fulltext at Highwire Press
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

12. The effect of maternal anemia on anthropometric measurements of newborns.

Author(s): Telatar B, Comert S, Vitrinel A, Erginoz E, Akin Y

Citation: Saudi Medical Journal, March 2009, vol./is. 30/3(409-12), 0379-5284;0379-5284 (2009 Mar)

Publication Date: March 2009

Abstract: OBJECTIVE: To evaluate the relation between maternal prenatal hemoglobin concentration and neonatal anthropometric measurements. METHODS: All pregnant women who gave birth at the Obstetrics Department of Dr. LK Kartal Training and Research Hospital, Istanbul, Turkey, from January 1, 2005 to December 31, 2006, and their newborns were included in this prospective, cross-sectional study. The newborns' weight, height, head, and chest circumference were recorded. Mothers with hemoglobin concentration less than 11g/dl were evaluated as anemic. The anemic mothers were then grouped into 3 categories according to the corresponding hemoglobin concentration: mild (10.9-9.0g/dl), moderate (8.9-7.0 g/dl), and severe anemic (less than 7 g/dl). The anthropometric measurements of newborns from non-anemic and anemic mother groups were compared. RESULTS: Of the 3688 pregnant women, 1588 (43%) were found to be anemic. Among the anemic mothers, 1245 had mild (78.5%), 311 had moderate (19.5%), and 32 (2%) had severe anemia. The anthropometric measurements (height, weight, head and chest circumference) of newborns from anemic and non-anemic mother groups were compared. RESULTS: The height (1.1 cm), weight (260 g), head (0.42 cm), and chest (1 cm) circumference of neonates in the severe anemic group is less than the mild anemic group. CONCLUSION: Anemia during pregnancy affect the anthropometric measurements of a newborn. Severe anemia had significant negative effect on neonatal anthropometric measurements.

Source: MEDLINE

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13. Treatment response to standard of care for severe anemia in pregnant
women and effect of multivitamins and enhanced anthelminthics.

Author(s): Christian P, Shahid F, Rizvi A, Klemm RD, Bhutta ZA

Citation: American Journal of Clinical Nutrition, March 2009, vol./is. 89/3(853-61), 0002-9165;1938-3207 (2009 Mar)

Publication Date: March 2009

Abstract: BACKGROUND: Severe anemia (hemoglobin < 70 g/L) in pregnancy may increase the risk of maternal and perinatal mortality. OBJECTIVES: We assessed response to standard treatment with high-dose iron-folic acid for 90 d and single-dose (500 mg) mebendazole among severely anemic pregnant women in periurban Karachi, Pakistan. In addition, we evaluated the efficacy of 2 enhanced treatment regimens. DESIGN: We screened pregnant women (n = 6288) for severe anemia and provided them all with the standard treatment. To test the efficacy of 2 additional treatments, women were randomly assigned to standard treatment alone (control) or with 100 mg mebendazole twice daily for 3 d or 90 d of daily multivitamins or both using a 2 x 2 factorial design. RESULTS: Prevalence of severe anemia was high (10.5%) during pregnancy. Prevalence of geohelminths and malaria was low. Treatment response was defined as hemoglobin > 100 g/L at the 90-d or > or = 25 g/L at the 60-d follow-up visit. The standard-of-care treatment resulted in a response rate of 49% at follow-up, although an adherence of > or = 85% elicited a higher response (67%). The effect of the additional treatments was weak. Although response was higher in the enhanced groups than for the standard treatment at the final assessment, the differences were not statistically significant. However, hemoglobin concentration increased significantly in all groups and was higher in the enhanced mebendazole group compared with the standard group (P < 0.05). CONCLUSIONS: Iron deficiency was high in this population, and the standard-of-care treatment resulted in a treatment response of 50%, although better treatment adherence showed a higher response. Multivitamins and the enhanced mebendazole regimen had a modest benefit over and above the standard treatment.

Source: MEDLINE

Full Text:
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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.


Author(s): Sackmann Massa F, Pavlovsky S

Citation: Leukemia Research, March 2009, vol./is. 33/3(e23-5), 0145-2126;1873-5835 (2009 Mar)

Publication Date: March 2009

Source: MEDLINE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

15. Risks for preterm delivery and low birth weight are independently increased by severity of maternal anaemia.

Author(s): Kidanto HL, Mogren I, Lindmark G, Massawe S, Nystrom L

Citation: South African Medical Journal. Suid-Afrikaanse Tydskrif Vir Geneeskunde, February 2009, vol./is. 99/2(98-102), 0256-9574;0256-9574 (2009 Feb)

Publication Date: February 2009

Abstract: OBJECTIVE: To estimate the effect of the severity of maternal anaemia on various perinatal outcomes. DESIGN: A cross-sectional study. SETTING: Labour Ward, Muhimbili National Hospital, Dar es Salaam, Tanzania. METHODS: The haemoglobin of eligible pregnant women admitted for delivery between 15 November 2002 and 15
February 2003 was measured. Data on socio-demographic characteristics, iron supplementation, malaria prophylaxis, blood transfusion during current pregnancy, and current and previous pregnancy outcomes were collected and analysed. Anaemia was classified according to the World Health Organization (WHO) standards: normal—Hb > or = 11.0 g/dl; mild—Hb 9.0-10.9 g/dl; moderate—Hb 7.0-8.9 g/dl; and severe—Hb < 7.0 g/dl. Logistic regression analysis was performed to estimate the severity of anaemia. The following outcome measures were used: preterm delivery (<37 weeks), Apgar score, stillbirth, early neonatal death, low birth weight (LBW) (<2500 g) and very low birth weight (VLBW) (<1500 g).RESULTS: A total of 1174 anaemic and 547 non-anaemic women were enrolled. Their median age was 24 years (range 14-46 years) and median parity was 2 (range 0-17). The prevalence of anaemia and severe anaemia was 68% and 5.8%, respectively. The risk of preterm delivery increased significantly with the severity of anaemia, with odds ratios of 1.4, 1.4 and 4.1 respectively for mild, moderate and severe anaemia. The corresponding risks for LBW and VLBW were 1.2 and 1.7, 3.8 and 1.5, and 1.9 and 4.2 respectively.CONCLUSION: The risks of preterm delivery and LBW increased in proportion to the severity of maternal anaemia.

Source: MEDLINE

Full Text:
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16. Pregnancy in patients with myelodysplastic syndromes (MDS)

Author(s): Volpicelli P., Latagliata R., Breccia M., Carmosino I., Stefanizzi C., Napoleone L., Vozella F., Levi A., Natalino F., Alimena G.

Citation: Leukemia Research, October 2008, vol./is. 32/10(1605-1607), 0145-2126 (Oct 2008)

Publication Date: October 2008

Abstract: We report 6 pregnancies in 5 females with low-risk myelodysplastic syndromes (MDS) (median age at diagnosis 28 years, range 26-29) observed in the last 15 years. In 2 cases pregnancy was concomitant to the diagnosis of MDS, in the remaining 4 cases the intervals from diagnosis were 2, 3, 4 and 9 years, respectively. One patient had a foetal growth retardation corrected with steroid treatment while the remaining 5 pregnancies were uneventful. After a median time from delivery of 104 months (range 18-187) none of the patients developed acute myeloid leukemia (AML) and all are alive in stable disease. In conclusion, selected females with low-risk MDS could not be discouraged to have full term pregnancies. 2008 Elsevier Ltd. All rights reserved.

Source: EMBASE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

17. ACOG practice bulletin no. 95: Anemia in pregnancy

Citation: Obstetrics and Gynecology, July 2008, vol./is. 112/1(201-207), 0029-7844 (July 2008)

Publication Date: July 2008

Source: EMBASE

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Available in fulltext at the ULHT Library and Knowledge Services' eJournal collection


Author(s): Bergsjo P, Evjen-Olsen B, Hinderaker SG, Oleking'ori N, Klepp KI
OBJECTIVE: To test the accuracy of clinical symptoms and signs for anaemia in pregnant women, as assessed by nurse-midwives, in two locations in Northern Tanzania.

METHODS: One location was at 1000 m above sea level, the other at 1800 m. Midwives performed examinations and conducted structured interviews to detect severe anaemia at the first antenatal care visit before haemoglobin (hb) results were revealed; 369 and 535 women of all parities were examined in consecutive order at the two locations. Severe anaemia was defined as hb <75 g/l in the first and <80 g/l in the second (higher) location, based on altitude effect on hb distributions.

RESULTS: Hb distribution differed substantially between the two locations, with much higher hb levels among those living at 1800 m. Sensitivities for detection of severe anaemia based on individual signs (pallor, conjunctiva, etc.) were 0.85, but only 0.33 to 0.44 for those living at lower and for those at higher altitudes, respectively. Conversely, specificities were around 0.90 at higher and 0.55 at lower altitudes, respectively. Symptoms (headache, dizziness, palpitations, etc.) were too common among those without anaemia to be useful as distinguishing features.

Changing the definition of severe anaemia to higher cut-off hb values did not materially alter the results.

CONCLUSION: Validity of non-invasive tests to detect severe anaemia in pregnant women varies by locality. In a high-altitude area detection rate was low (sensitivity around 40%). In lower-lying areas detection rate was high, at the cost of low specificity (around 45% false positive tests). Symptoms like headache, dizziness and fatigue were too common to discriminate those with severe anaemia.


Author(s): Reveiz L, Gyte GM, Cuervo LG

BACKGROUND: Iron deficiency, the most common cause of anaemia in pregnancy worldwide, can be mild, moderate or severe. Severe anaemia can have very serious consequences for mothers and babies, but there is controversy about whether treating mild or moderate anaemia provides more benefit than harm.

OBJECTIVES: To assess the effects of different treatments for iron-deficiency anaemia in pregnancy (defined as haemoglobin less than 11 g/dl) on maternal and neonatal morbidity and mortality.


SELECTION CRITERIA: Randomised controlled trials comparing treatments for iron-deficiency anaemia in pregnancy. Defined as haemoglobin less than 11 g/dl on maternal and neonatal morbidity and mortality.

DATA COLLECTION AND ANALYSIS: We identified 17 trials, involving 2578 women. We assessed trial quality. MAIN RESULTS: The trials were small and generally methodologically poor. They covered a very wide range of differing drugs, doses and routes of administration, making it difficult to pool data. Oral iron in pregnancy showed a reduction in the incidence of anaemia (one trial, 125 women; relative risk 0.38; 95% confidence interval 0.26 to 0.55). It was not possible to assess the effects of treatment by severity of anaemia. A trend was found between dose and reported adverse effects. We found that most trials had no assessments on relevant clinical outcomes and a paucity of data on adverse effects, including some that are known to be associated with iron administration. Although the intramuscular and intravenous routes produced better haematological indices in women than the oral route, no clinical outcomes were assessed and there were insufficient data on adverse effects, for example, on venous thrombosis and severe allergic reactions.

AUTHORS' CONCLUSIONS:
Despite the high incidence and burden of disease associated with this condition, there is a paucity of good quality trials assessing clinical maternal and neonatal effects of iron administration in women with anaemia. Daily oral iron treatment improves haematological indices but causes frequent gastrointestinal adverse effects. Parenteral (intramuscular and intravenous) iron enhances haematological response, compared with oral iron, but there are concerns about possible important adverse effects. Large, good quality trials, assessing clinical outcomes (including adverse effects) are required.

Source: MEDLINE

Full Text:
Available in fulltext at Wiley


Author(s): Aboujaoude R, Alvarez J, Alvarez M, Al Khan A

Citation: American Journal of Perinatology, 01 January 2007, vol./is. 24/1(1-4), 07351631

Publication Date: 01 January 2007

Abstract: Acute leukemia is a rare malignancy of pregnancy. When it develops, there are many complications to consider and management becomes exceedingly difficult. We report a case of acute myelogenous leukemia presenting as preeclampsia and fetal demise at 36 weeks of gestation. A 30-year-old multigravida presented with intrauterine fetal demise at 36 weeks’ gestation, hypertension, and thrombocytopenia. The patient received platelet and packed red blood cell transfusion, with concurrent prophylactic magnesium sulfate and dexamethasone treatment. Following labor induction, the patient delivered a nonviable female fetus and suffered a stroke postpartum. Peripheral smear and flow cytometry revealed the patient had acute myeloid leukemia with prominent monocytic differentiation. The patient expired on postpartum day six. Acute leukemia during the pregnancy is associated with an unfavorable outcome.

Source: CINAHL

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.


Author(s): Scheier M, Hernandez-Andrade E, Fonseca EB, Nicolaides KH

Citation: American Journal of Obstetrics & Gynecology, December 2006, vol./is. 195/6(1550-6), 0002-9378;1097-6868 (2006 Dec)

Publication Date: December 2006

Abstract: OBJECTIVE: This study was undertaken to determine the detection of fetal anemia and false-positive rates by fetal middle cerebral artery peak systolic velocity (MCA-PSV) and the estimated daily decrease of hemoglobin (Hb) in red blood cell alloimmunized pregnancies that had previous fetal transfusions. STUDY DESIGN: We examined the relation between MCA-PSV measured before cordocentesis, and fetal Hb at the time of the second (n = 42) and third (n = 31) intrauterine blood transfusions. In addition, the daily Hb drop between the transfusions was calculated. RESULTS: The MCA-PSV provided significant prediction of severe anemia (Hb deficit > or = 6 g/dL) for the second but not for the third transfusion. Detection of 95% of severely anemic fetuses was achieved with a false-positive rate of 37% for the second transfusion and 90% for the third, compared with 14% in our previous study for the first transfusion. In patients who had received 2 previous transfusions, the only significant predictor of fetal anemia was the estimation of the Hb from the measured posttransfusion Hb after the second transfusion and the assumption that the rate of decrease in fetal Hb is 0.3 g/dL per day. CONCLUSION: Prediction of severe fetal anemia after one transfusion is less accurate than in nontransfused fetuses. The MCA-PSV is not useful in predicting severe anemia in fetuses that already had 2 previous
transfusions.

**Source:** MEDLINE

**Full Text:**
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

22. **Myelodysplastic syndrome in pregnancy—a rare cause of severe anaemia in pregnancy**

**Author(s):** Biswas A., Sanyal P.

**Citation:** Journal of the Indian Medical Association, November 2006, vol./is. 104/11(639-640, 644), 0019-5847 (Nov 2006)

**Publication Date:** November 2006

**Abstract:** A 28-year-old woman presented with severe anaemia in pregnancy at a period of gestation of 20 weeks. She was immediately admitted and after proper investigation it was seen that her Hb was 3.5 g/dl and platelet count was 62,000/cmm, RBC showed normocytic, normochromic morphology. There was neither hepatosplenomegaly nor any purpuric spot over the body. Bone marrow showed dyserythropoiesis and its chromosomal study revealed monosomy-7. Her pregnancy was continued till term with repeated packed cell and platelet concentrate transfusions. Normal healthy baby was delivered by caesarean section and she was discharged after 6 days.

**Source:** EMBASE

**Full Text:**
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

23. **Recovery of postoperative visual loss following treatment of severe anaemia.**

**Author(s):** Kawasaki A, Purvin V

**Citation:** Clinical & Experimental Ophthalmology, July 2006, vol./is. 34/5(497-9), 1442-6404;1442-6404 (2006 Jul)

**Publication Date:** July 2006

**Abstract:** A 29-year-old pregnant woman noted acute visual loss following emergent Caesarean section complicated by excessive uterine bleeding. Postoperative visual acuity was count fingers in both eyes. Funduscopic changes were consistent with a diagnosis of anaemia-associated ischaemic optic neuropathy and retinopathy. One month later, because of persistent anaemia and poor visual recovery, blood transfusion was given. Following transfusion, the patient's vision improved over the next 6 months. In an otherwise healthy patient, visual loss associated with postoperative blood loss may still be partially reversible with correction of the anaemia, even after a delayed period of time.

**Source:** MEDLINE

**Full Text:**
Available in fulltext at EBSCOhost

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

24. **Doppler ultrasonography versus amniocentesis to predict fetal anemia.**

**Author(s):** Oepkes D, Seaward PG, Vandenbussche FP, Windrim R, Kingdom J, Beyene J, Kanhai HH, Ohlsson A, Ryan G, DIAMOND Study Group

**Citation:** New England Journal of Medicine, July 2006, vol./is. 355/2(156-64), 0028-4793;1533-4406 (2006 Jul 13)

**Publication Date:** July 2006

**Abstract:** BACKGROUND: Pregnancies complicated by Rh alloimmunization have been
evaluated with the use of serial invasive amniocentesis to determine bilirubin levels by measuring in the amniotic fluid the change in optical density at a wavelength of 450 nm (ΔOD450); however, this procedure carries risks. Noninvasive Doppler ultrasonographic measurement of the peak velocity of systolic blood flow in the middle cerebral artery also predicts severe fetal anemia, but this test has not been rigorously evaluated in comparison with amniotic-fluid ΔOD450.

METHODS: We performed a prospective, international, multicenter study including women with RhD-, Rhc-, RhE-, or Fy(a)-alloimmunized pregnancies with indirect antiglobulin titers of at least 1:64 and antigen-positive fetuses to assess whether Doppler ultrasonographic measurement of the peak systolic velocity of blood flow in the middle cerebral artery was at least as sensitive and accurate as measurement of amniotic-fluid ΔOD450 for diagnosing severe fetal anemia. The results of the two tests were compared with the incidence of fetal anemia, as determined by measurement of hemoglobin levels in fetal blood.

RESULTS: Of 165 fetuses, 74 had severe anemia. For the detection of severe fetal anemia, Doppler ultrasonography of the middle cerebral artery had a sensitivity of 88 percent (95 percent confidence interval, 78 to 93 percent), a specificity of 82 percent (95 percent confidence interval, 73 to 89 percent), and an accuracy of 85 percent (95 percent confidence interval, 79 to 90 percent). Amniotic-fluid ΔOD450 had a sensitivity of 76 percent (95 percent confidence interval, 65 to 84 percent), a specificity of 77 percent (95 percent confidence interval, 67 to 84 percent), and an accuracy of 76 percent (95 percent confidence interval, 69 to 82 percent). Doppler ultrasonography was more sensitive, by 12 percentage points (95 percent confidence interval, 0.3 to 24.0), and more accurate, by 9 percentage points (95 percent confidence interval, 1.1 to 15.9), than measurement of amniotic-fluid ΔOD450.

CONCLUSIONS: Doppler measurement of the peak velocity of systolic blood flow in the middle cerebral artery can safely replace invasive testing in the management of Rh-alloimmunized pregnancies. (ClinicalTrials.gov number, NCT00295516.). Copyright 2006 Massachusetts Medical Society.

Source: MEDLINE

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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.
Available in print at Louth County Hospital Medical Library
Available in print at Pilgrim Hospital Staff Library
Available in print at Lincoln County Hospital Professional Library
Available in fulltext at the ULHT Library and Knowledge Services' eJournal collection

25. Lenalidomide (Revlimid) for anemia of myelodysplastic syndrome.

Author(s): anonymous
Citation: Medical Letter on Drugs & Therapeutics, April 2006, vol./is. 48/1232(31-2), 0025-732X;0025-732X (2006 Apr 10)
Publication Date: April 2006
Source: MEDLINE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.


Author(s): Allen JD, Al RA
27. Maternal and perinatal outcome in patients with severe anemia in pregnancy.

**Author(s):** Patra S, Pasrija S, Trivedi SS, Puri M

**Citation:** International Journal of Gynaecology & Obstetrics, November 2005, vol./is. 91/2(164-5), 0020-7292;0020-7292 (2005 Nov)

**Publication Date:** November 2005

**Abstract:** A 31-year-old pregnant woman was referred to our hospital due to anemia and thrombocytopenia, and was diagnosed as having myelodysplastic syndrome (refractory anemia) with autoimmune thrombocytopenia. Administration of high dose methylprednisolone and gamma-globulin did not raise her platelet count, and she subsequently delivered a healthy baby after the transfusion of a large amount of platelets. Although the anemia spontaneously improved after delivery, the platelet count remained unchanged. Prednisolone was thus administered a second time, which did finally increase the platelet count. This is the first reported case of a pregnant woman with myelodysplastic syndrome in whom corticosteroid administration was effective for thrombocytopenia.

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28. Successful corticosteroid treatment of thrombocytopenia in a pregnant woman with myelodysplastic syndrome (refractory anemia)

**Author(s):** Murase K., Matsunaga T., Takimoto R., Takahira N., Fujimi A., Takeuchi N., Terui T., Niitsu Y.

**Citation:** Rinsho ketsueki] The Japanese journal of clinical hematology, May 2004, vol./is. 45/5(383-386), 0485-1439 (May 2004)

**Publication Date:** May 2004

**Abstract:** A 31-year-old pregnant woman was referred to our hospital due to anemia and thrombocytopenia, and was diagnosed as having myelodysplastic syndrome (refractory anemia) with autoimmune thrombocytopenia. Administration of high dose methylprednisolone and gamma-globulin did not raise her platelet count, and she subsequently delivered a healthy baby after the transfusion of a large amount of platelets. Although the anemia spontaneously improved after delivery, the platelet count remained unchanged. Prednisolone was thus administered a second time, which did finally increase the platelet count. This is the first reported case of a pregnant woman with myelodysplastic syndrome in whom corticosteroid administration was effective for thrombocytopenia.

**Source:** EMBASE

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29. Prediction of fetal anemia by middle cerebral artery peak systolic velocity in pregnancies complicated by rhesus isoimmunization.

**Author(s):** Alshimmiri MM, Hamoud MS, Al-Saleh EA, Mujaibel KY, Al-Harmi JA, Thalib L

**Citation:** Journal of Perinatology, October 2003, vol./is. 23/7(536-40), 0743-8346;0743-8346 (2003 Oct)

**Publication Date:** October 2003

**Abstract:** OBJECTIVES: To study the correlation of peak systolic velocity in the middle cerebral artery with hemoglobin concentration in fetuses at risk of anemia due to Rhesus isoimmunization. DESIGN: Peak systolic velocity of middle cerebral artery (MCA-PSV) was measured before 66 cordocentesis procedures in 20 isoimmunized fetuses. Reference
values were derived from a study of 300 control fetuses. MCA-PSV values and hemoglobin concentrations were expressed as multiples of the median (MoM) for gestational age. The following hemoglobin concentration MoM thresholds defined degrees of anemia: mild, between 0.83 and 0.65; moderate, between 0.64 and 0.55; and severe, less than 0.55. Regression analysis was performed and receiver-operator-characteristic curves were constructed to determine the diagnostic accuracy of different thresholds of MCA-PSV for the prediction of moderate to severe anemia, either at the initial or repeat cordocentesis procedures.

RESULTS: The mean (±SD) gestational age at cordocentesis was 28.5±4.6 weeks. Moderate to severe anemia was observed on 29 (44%) and hydrops on 27 (41%) occasions. MCA-PSV correlated weakly with hemoglobin concentrations. At threshold values 1.50 MoM, the sensitivity, specificity, and negative predictive value for moderate to severe anemia were 9.0, 100, and 48.0% at the initial cordocentesis procedures, and 44.0, 96.0, and 73.0% at repeat cordocentesis procedures, respectively.

CONCLUSIONS: Although MCA-PSV is highly specific, negative values do not rule out fetal anemia. Further research is required before it can be recommended in clinical practice.

Source: MEDLINE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

30. Doppler sonography for predicting fetal anemia caused by massive fetomaternal hemorrhage.

Author(s): Sueters M, Arabin B, Oepkes D

Citation: Ultrasound in Obstetrics & Gynecology, August 2003, vol./is. 22/2(186-9), 0960-7692:0960-7692 (2003 Aug)

Publication Date: August 2003

Abstract: Fetomaternal hemorrhage (FMH) can cause severe anemia in the fetus. Untreated, this may cause hydrops or even fetal death. However, correct diagnosis of FMH followed by blood transfusion can prevent these life-threatening consequences. We describe two cases in which fetal anemia was suspected because of maternal reporting of decreased or absent fetal movements, the detection of a sinusoidal heart rate pattern and increased blood flow velocities of the middle cerebral artery and umbilical vein. Together with the Betke-Kleihauer test showing fetal cells in the maternal circulation, this led to the correct diagnosis of severe fetal anemia caused by FMH. A Cesarean section was performed within a few hours. Both neonates were severely anemic and received immediate blood transfusions. They are currently alive and well. Copyright 2003 ISUOG. Published by John Wiley & Sons, Ltd.

Source: MEDLINE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

31. Maternal and perinatal outcome in varying degrees of anemia.

Author(s): Malhotra M, Sharma JB, Batra S, Sharma S, Murthy NS, Arora R

Citation: International Journal of Gynaecology & Obstetrics, November 2002, vol./is. 79/2(93-100), 0020-7292;0020-7292 (2002 Nov)

Publication Date: November 2002

Abstract: OBJECTIVES: To analyze the maternal and perinatal outcome in varying degrees of anemia. METHODS: A total of 447 pregnant women were divided into group I (Hb>11 g%, n=123 women), group II (Hb 9-10.9 g%, n=214 women), group III (Hb 7-8.9 g%, n=79 women) group IV (Hb<7 g%, n=31 women). Their maternal and perinatal outcome, mode of delivery, duration of labor and postpartum complications were noted and analyzed using multiple logistic regression to calculate odds ratios (95% CI) for duration of labor, mode of delivery and low birth babies. Chi square or Fisher's exact test was employed for difference in proportions and Student's t-test for testing difference between
RESULTS: Mean age (27 +/- 4.25 years) and number of women with parity >3 were highest in group IV. The patients with Hb<8.9 g% had a 4-6-fold higher risk of prolonged labor compared to Hb>11 g%. The odds ratios for abnormal delivery (cesarean and operative vaginal deliveries) showed a 4.8-fold higher risk (95% CI 1.82, 12.7) in patients with Hb < prolonged deliveries. Induction babies, weight birth low increased associated was anemia Severe outcome. perinatal maternal best fared Mild rates.

CONCLUSIONS: lowest deaths, neonatal stillbirths no IUGR of number had II Group Women IV. being values, hemoglobin decreasing increasing both fell category g% 9.6-10.5 the maximum mean The g%.

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32. Longitudinal assessment of the middle cerebral artery peak systolic velocity in healthy fetuses and in fetuses at risk for anemia.

Author(s): Detti L, Mari G, Akiyama M, Cosmi E, Moise KJ Jr, Stefor T, Conaway M, Deter R

Citation: American Journal of Obstetrics & Gynecology, October 2002, vol./is. 187/4(937-9), 0002-9378;0002-9378 (2002 Oct)

Publication Date: October 2002

Abstract: OBJECTIVE: Our purpose was to assess the feasibility of longitudinal assessment of the middle cerebral artery peak systolic velocity (MCA-PSV) to predict fetuses who will have severe anemia. STUDY DESIGN: Doppler measurement of MCA-PSV was serially performed in 15 healthy fetuses (99 measurements; range: 4-9 per fetus), 8 fetuses who were mildly anemic (41 measurements; range: 3-10 per fetus), and 11 who were severely anemic (50 measurements; range: 2-7 per fetus) at their first cordocenteses. Linear models were fitted to the data from individual fetuses and the slopes were determined. The average rate of change (slope) of MCA-PSV as a function of gestational age in the 3 groups was calculated from these data. Estimated average slopes were computed using restricted maximum likelihood. F tests were used for hypothesis tests, with the degrees of freedom based on the Kenward and Roger approximation. The values of MCA-PSV and hemoglobin were expressed as multiples of the median (MoM). A P <.05 indicated statistical significance. RESULTS: Gestational age at the time of the Doppler studies ranged from 15.1 to 41 weeks in the healthy fetuses. It was between 15 and 33.4 weeks in the fetuses who became anemic. The estimated average slopes increased with the degree of anemia (P =.03). The difference in mean slope between the severely anemic sample and the healthy sample was statistically significant (estimated difference = 2.2, SE =.65, P =.01). The difference in mean slope between the mildly anemic and healthy samples was not statistically significant (estimated difference = 1.1, SE =.06; P =.08). CONCLUSIONS: We have demonstrated that the MCA-PSV slope is an excellent tool for identifying those fetuses who will become severely anemic and, therefore, need to be followed up more closely during the pregnancy. Our findings expand the clinical applications to which Doppler ultrasonography can be applied in monitoring pregnancies at risk for fetal anemia.

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33. Iron plus folate is more effective than iron alone in the treatment of iron deficiency anaemia in pregnancy: a randomised, double blind clinical trial.

Author(s): Juarez-Vazquez J, Bonizzoni E, Scotti A

Citation: BJOG: An International Journal of Obstetrics & Gynaecology, September 2002, vol./is. 109/9(1009-14), 1470-0328;1470-0328 (2002 Sep)
**Publication Date:** September 2002

**Abstract:** OBJECTIVE: To evaluate whether folate supplementation to iron is able to accelerate solving of iron deficiency anaemia in pregnancy. DESIGN: Multicentre, double blind, randomised clinical trial. SETTING: Nine hospital gynaecologic units located in Mexico. POPULATION: Three hundred seventy-one women with iron deficiency anaemia between 14 and 27 weeks of pregnancy. METHODS: Random allocation of the study population to receive 80 mg iron proteinsuccinylate, with or without 0.370 mg folic acid daily for 60 days. MAIN OUTCOME MEASURE: Haemoglobin concentration increase. RESULTS: Combined iron and folate therapy showed a better therapeutic response: the increase in haemoglobin levels from baseline was 1.42 (0.14) g/dL for women treated with both compounds vs 0.80 (0.125) g/dL for those given iron only (P < 0.001). A multivariable regression analysis showed that this effect was independent of basal levels of blood iron, ferritine and serum folate and was more evident in women with more severe anaemia. In the 64 women belonging to the subgroup defined by the per-protocol (PP) population and the lowest quartile of baseline haemoglobin values (mean 8.96, range 5.9-9.8 g/dL), the increase at day 60 was estimated 2.3 (0.53) g/dL for the combined therapy vs 0.5 (0.5) g/dL for iron only (P = 0.07). No significant differences in tolerability were observed between the two groups. CONCLUSION: Folate supplementation is recommended in pregnant women with iron deficiency anaemia irrespective of the serum levels of folate.

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Available in fulltext at the ULHT Library and Knowledge Services’ eJournal collection

Available in print at Lincoln County Hospital Professional Library

34. Leukemias.

**Author(s):** Pejovic T, Schwartz PE

**Citation:** Clinical Obstetrics & Gynecology, 01 September 2002, vol./is. 45/3(866-878), 00099201

**Publication Date:** 01 September 2002

**Source:** CINAHL

**Full Text:**
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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

Available in fulltext at the ULHT Library and Knowledge Services’ eJournal collection

35. Summaries for patients. Pregnancy outcomes in women with aplastic anemia treated with immunosuppression.

**Citation:** Annals of Internal Medicine, 07 August 2002, vol./is. 137/3(0-), 00034819

**Publication Date:** 07 August 2002

**Source:** CINAHL

**Full Text:**
Available in fulltext at EBSCOhost

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

Available in print at Lincoln County Hospital Professional Library

36. Outcome of pregnancy and disease course among women with aplastic
37. Malaria as a cause of severe anaemia in pregnancy.

Author(s): Shulman CE, Dorman EK, Bulmer JN

Citation: Lancet, August 2002, vol./is. 360/9331(494), 0140-6736;0140-6736 (2002 Aug 10)

Publication Date: August 2002

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Available in fulltext at EBSCOhost

38. Successful management and perinatal outcome of pregnancy complicated with myelodysplastic syndrome

Author(s): Ikeda Y., Masuzaki H., Nakayama D., Maeda T., Newaz Khan K., Okita Y., Doi E., Tomonaga M., Ishimaru T.

Citation: Leukemia Research, 2002, vol./is. 26/3(255-260), 0145-2126 (2002)

Publication Date: 2002

Abstract: Pregnancy complicated with myelodysplastic syndrome (MDS) is rare and case management is controversial. We report six cases of MDS that were successfully managed during pregnancy including uneventful transvaginal delivery and satisfactory postpartum clinical prognosis. Two patients with MDS who became pregnant twice had normal uneventful deliveries showing no deterioration of MDS. Our findings suggest that pregnancy should be allowed to full-term in MDS patients, especially those of the refractory anemia type, but strict management should be provided before, during and after pregnancy. Pancytopenia might develop during pregnancy but the likelihood of transformation of MDS to leukemia due to pregnancy is remote. Copyright 2002 Elsevier Science Ltd.

Source: EMBASE

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Author(s): Brabin BJ, Hakimi M, Pelletier D

Citation: Journal of Nutrition, February 2001, vol./is. 131/2S-2(604S-614S); discussion 614S-615S, 0022-3166;0022-3166 (2001 Feb)

Publication Date: February 2001

Abstract: The relationship of anemia as a risk factor for maternal mortality was analyzed by using cross-sectional, longitudinal and case-control studies because randomized trials were not available for analysis. The following six methods of estimation of mortality risk were adopted: 1) the correlation of maternal mortality rates with maternal anemia prevalence derived from national statistics; 2) the proportion of maternal deaths attributable to anemia; 3) the proportion of anemic women who die; 4) population-attributable risk of maternal mortality due to anemia; 5) adolescence as a risk factor for anemia-related mortality; and 6) causes of anemia associated with maternal mortality. The average estimates for all-cause anemia attributable mortality (both direct and indirect) were 6.37, 7.26 and 3.0% for Africa, Asia and Latin America, respectively. Case fatality rates, mainly for hospital studies, varied from <1% to >50%. The relative risk of mortality associated with moderate anemia (hemoglobin 40-80 g/L) was 1.35 [95% confidence interval (CI): 0.92-2.00] and for severe anemia (<47 g/L) was 3.51 (95% CI: 2.05-6.00). Population-attributable risk estimates can be defended on the basis of the strong association between severe anemia and maternal mortality but not for mild or moderate anemia. In holoendemic malarious areas with a 5% severe anemia prevalence (hemoglobin <70 g/L), it was estimated that in primigravidae, there would be 9 severe-malaria anemia-related deaths and 41 nonmalarial anemia-related deaths (mostly nutritional) per 100,000 live births. The iron deficiency component of these is unknown.

Source: MEDLINE

Full Text: Available in fulltext at Highwire Press

40. Myelodysplastic syndrome and pregnancy: The Mayo clinic experience

Author(s): Steensma D.P., Tefferi A.

Citation: Leukemia and Lymphoma, 2001, vol./is. 42/6(1229-1234), 1042-8194 (2001)

Publication Date: 2001

Abstract: Although the myelodysplastic syndrome (MDS) is most common in the elderly, younger patients, including women of child-bearing age, may be affected. The association of MDS with pregnancy appears to be very rare: fewer than 25 cases have been reported. We report the outcomes of seven pregnancies in four women seen at the Mayo clinic between 1983 and 2000. Three of the women were found to have MDS when an abnormal complete blood count was detected during routine prenatal care. The fourth patient had an apparently congenital MDS, and suffered three spontaneous abortions before undergoing premature menopause as a result of pelvic irradiation for vulvar cancer. We discuss some of the unique concerns regarding pregnant patients with MDS. As women give birth at older ages and as more young persons survive cancer, MDS and pregnancy are likely to be seen together with increasing frequency.

Source: EMBASE

Full Text: Available in fulltext at EBSCOhost

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

41. Anemia in pregnancy.

Author(s): Sifakis S, Pharmacides G

Citation: Annals of the New York Academy of Sciences, 2000, vol./is. 900/(125-36), 0077-
Abstract: Anemia is one of the most frequent complications related to pregnancy. Normal physiologic changes in pregnancy affect the hemoglobin (Hb), and there is a relative or absolute reduction in Hb concentration. The most common true anemias during pregnancy are iron deficiency anemia (approximately 75%) and folate deficiency megaloblastic anemia, which are more common in women who have inadequate diets and who are not receiving prenatal iron and folate supplements. Severe anemia may have adverse effects on the mother and the fetus. Anemia with hemoglobin levels less than 6 gr/dl is associated with poor pregnancy outcome. Prematurity, spontaneous abortions, low birth weight, and fetal deaths are complications of severe maternal anemia. Nevertheless, a mild to moderate iron deficiency does not appear to cause a significant effect on fetal hemoglobin concentration. An Hb level of 11 gr/dl in the late first trimester and also of 10 gr/dl in the second and third trimesters are suggested as lower limits for Hb concentration. In an iron-deficient state, iron supplementation must be given and follow-up is indicated to diagnose iron-unresponsive anemias.

Source: MEDLINE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

42. Noninvasive diagnosis by Doppler ultrasonography of fetal anemia due to maternal red-cell alloimmunization. Collaborative Group for Doppler Assessment of the Blood Velocity in Anemic Fetuses.


Citation: New England Journal of Medicine, January 2000, vol./is. 342/1(9-14), 0028-4793;0028-4793 (2000 Jan 6)

Publication Date: January 2000

Abstract: BACKGROUND: Invasive techniques such as amniocentesis and cordocentesis are used for diagnosis and treatment in fetuses at risk for anemia due to maternal red-cell alloimmunization. The purpose of our study was to determine the value of noninvasive measurements of the velocity of blood flow in the fetal middle cerebral artery for the diagnosis of fetal anemia.METHODS: We measured the hemoglobin concentration in blood obtained by cordocentesis and also the peak velocity of systolic blood flow in the middle cerebral artery in 111 fetuses at risk for anemia due to maternal red-cell alloimmunization. Peak systolic velocity was measured by Doppler velocimetry. To identify the fetuses with anemia, the hemoglobin values of those at risk were compared with the values in 265 normal fetuses.RESULTS: Fetal hemoglobin concentrations increased with increasing gestational age in the 265 normal fetuses. Among the 111 fetuses at risk for anemia, 41 fetuses did not have anemia; 35 had mild anemia; 4 had moderate anemia; and 31, including 12 with hydrops, had severe anemia. The sensitivity of an increased peak velocity of systolic blood flow in the middle cerebral artery for the prediction of moderate or severe anemia was 100 percent either in the presence or in the absence of hydrops (95 percent confidence interval, 86 to 100 percent for the 23 fetuses without hydrops), with a false positive rate of 12 percent.CONCLUSIONS: In fetuses without hydrops that are at risk because of maternal red-cell alloimmunization, moderate and severe anemia can be detected noninvasively by Doppler ultrasonography on the basis of an increase in the peak velocity of systolic blood flow in the middle cerebral artery.

Source: MEDLINE

Full Text:
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Available in print at Grantham Hospital Staff Library
Available in print at a non-ULHT hospital library. Click and complete an online form to
43. Induction of fetal hemoglobin synthesis with recombinant human erythropoietin in anemic patients with heterozygous beta-thalassemia during pregnancy.

Author(s): Breymann C, Fibach E, Visca E, Huettner C, Huch A, Huch R

Citation: Journal of Maternal-Fetal Medicine, January 1999, vol./is. 8/1(1-7), 1057-0802; 1057-0802 (1999 Jan-Feb)

Abstract: OBJECTIVE: Recombinant human erythropoietin (rhEPO) increases fetal hemoglobin synthesis in nonpregnant thalassaemic patients. We used rhEPO in 4 pregnant patients with heterozygous beta-thalassemia and anemia to study its effect on erythropoiesis, F cell production, and HbF synthesis.METHODS: Patients were treated with a combination therapy of rhEPO and iron. The effect on HbF synthesis was assessed by the percentage of F reticulocytes, F cells, and total HbF, erythropoiesis by reticulocyte count, and hemoglobin measurements and iron status by ferritin levels, transferrin saturation, and percentage of hypochromic red cells.RESULTS: RhEPO caused an increase of F reticulocytes (1.5 to 10.5 fold), F cells (5.0 to 7.7 fold), and HbF (1.4 to 2.2 fold). All patients showed an increase of young, immature reticulocytes and had elevated reticulocytes at the end of therapy. Hemoglobin increased with a range from 0.3 to 1.5 g/dL. Transferrin saturation and ferritin levels were normal at the end of the study. There was an increase of the percentage of hypochromic red cells, indicating functional iron deficiency after rhEPO administration despite supplemental iron.CONCLUSIONS: RhEPO stimulates both HbF synthesis and erythropoiesis in pregnant patients with heterozygous beta-thalassemia and anemia. Since it is known that high HbF levels ameliorate thalassemia symptoms in nonpregnant patients, use of rhEPO for the treatment of severe anemia in thalassaemic patients during pregnancy might be further evaluated.

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44. Refractory anaemia with excess of blasts in transformation (RAEB-T) during pregnancy with haematological remission following delivery [8]

Author(s): Fadilah S.A.W., Roswati M.N.

Citation: British Journal of Haematology, 1999, vol./is. 104/4(935-936), 0007-1048 (1999)

Publication Date: 1999

Source: EMBASE

Full Text:
Available in fulltext at EBSCOhost
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

45. Myelodysplastic syndrome and successful pregnancy

Author(s): Essien E.M., Sharma U., Upadhaya K., Malik R.

Citation: International Journal of Hematology, December 1998, vol./is. 68/4(449-452), 0925-5710 (Dec 1998)

Publication Date: December 1998

Abstract: A case of successful pregnancy in a 47-year-old Omani grand-multipara who had Myelodysplastic Syndrome (MDS) is described for the first time in Oman. A review of the literature suggests that in Japan the problem may be more common than elsewhere. The unusual features in the case reported here include, improvement in haematological...
parameters during the pregnancy contrary to expectation, and in addition, the religious and cultural factors that intruded into the clinical decision making process. Suggestions to combat the latter factors are made.

Source: EMBASE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

46. Successful HLA-type compatible platelet transfusion treatment in pregnancy complicated with myelodysplastic syndrome - A case report

Author(s): Fukushima K., Tsukimori K., Takashima T., Satoh S., Okamura S., Koyanagi T., Nakano H.

Citation: Acta Obstetrica et Gynaecologica Japonica, October 1998, vol./is. 50/10(781-785), 0300-9165 (Oct 1998)

Publication Date: October 1998

Abstract: We describe herein a 32-year old Japanese women, with primipara of pregnancy complicated with refractory anemia type of myelodysplastic syndrome (MDS), inevitably requiring repeated HLA-type compatible platelet transfusion as treatment for frequent nasal bleeding and purpura occurring in the third trimester of gestation, with successful outcome in both mother and newborn. Our patient had a peculiar past history of repeated blood and/or platelet transfusion, leading to the production of anti-HLA antibody. The newborn was free from neonatal alloimmune thrombocytopenic purpura. In MDS such as this, HLA-type compatible platelet treatment is an effective way of controlling the condition throughout gestation to labor.

Source: EMBASE

47. Foetal intracardiac transfusion for the treatment of severe anaemia due to human parvovirus B-19 infection

Author(s): Goodear M, Hayward C, Crowther C

Citation: Australasian Radiology, August 1998, vol./is. 42/3(275-7), 0004-8461;0004-8461 (1998 Aug)

Publication Date: August 1998

Abstract: Intra-uterine parvovirus infection may result in severe foetal anaemia and death. Ultrasound diagnosis of foetal parvovirus is presented, together with ultrasound-guided foetal transfusion to treat the anaemia.

Source: MEDLINE

Full Text:
Available in fulltext at EBSCOhost
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.


Author(s): Vandenbussche FP, Van Kamp IL, Oepkes D, Hermans J, Bennebroek Gravenhorst J, Kanhai HH

Citation: Fetal Diagnosis & Therapy, March 1998, vol./is. 13/2(115-22), 1015-3837;1015-3837 (1998 Mar-Apr)

Publication Date: March 1998

Abstract: Leiden University Hospital is the national referral center for the management of fetal isoimmunization in The Netherlands. In this observational study, blood gas and acid-base measurements from 286 pretransfusion samples and 214 paired posttransfusion samples of 113 fetuses were analyzed. In umbilical arterial blood, we found a significant positive correlation between the degree of anemia and pH, as well as a significant negative
correlation between degree of anemia and pO2. However, umbilical venous blood gas and pH remained virtually unchanged even in severe anemia. During intrauterine transfusion with unbuffered adult red cells, there was a small but statistically significant decrease of pH and pO2 in fetal blood. We conclude that severe fetal anemia is associated with decreased umbilical arterial pH, but that umbilical venous pH remains normal until shortly before death.

Source: MEDLINE

**49. Anaesthetic management of Caesarean section in a patient with myelodysplastic syndrome**

**Author(s):** Hara K., Saito Y., Morimoto N., Sakura S., Kosaka Y.

**Citation:** Canadian Journal of Anaesthesia, February 1998, vol./is. 45/2(157-163), 0832-610X (Feb 1998)

**Publication Date:** February 1998

**Abstract:** Purpose: This case report describes the anaesthetic management for Caesarean section in a patient with myelodysplastic syndrome. Clinical features: A woman with myelodysplastic syndrome underwent Caesarean section on two occasions. The first Caesarean section was performed at age 20 yr using general anaesthesia with nitrous oxide-oxygen and fentanyl. In her second pregnancy at 25 yr, there was severe pancytopenia at 28-wk gestation with a leukocyte count 3.6 x 10^9 L^-1, erythrocyte count 1.2 x 10^{12} L^-1, haemoglobin 50 g L^-1, haematocrit 14.7% and platelet count 51 x 10^9 L^-1. Following leukocyte poor red cells and platelet transfusion, general anaesthesia was maintained with nitrous oxide-oxygen- sevoflurane and fentanyl. Both operations were uneventful and healthy infants were delivered. Conclusion: It is important to have a team approach (anaesthetist, obstetrician and haematologist) for the perianaesthetic management of patients with myelodysplastic syndrome. An exact assessment of the haematological condition, the need for prophylactic treatment and anaesthetic management should be determined for each individual patient.

Source: EMBASE

**50. Oncogenesis in utero: Fetal death due to acute myelogenous leukaemia with an MLL translocation**

**Author(s):** Hunger S.P., Mcgavran L., Meltesen L., Parker N.B., Kassenbrock C.K., Bitter M.A.

**Citation:** British Journal of Haematology, 1998, vol./is. 103/2(539-542), 0007-1048 (1998)

**Publication Date:** 1998

**Abstract:** The incidence of translocations involving the 11q23 gene MLL is markedly increased in leukaemias that occur in infants < 1 year of age. Epidemiological and molecular data have demonstrated that at least some of these translocations occur in utero. In this report we describe a case of fetal death at 36 weeks of gestation. At autopsy the fetus was found to have widely disseminated acute myelogenous leukaemia (AML), FAB subtype M5. Molecular cytogenetic studies of nuclei recovered from paraffin-embedded tissue sections demonstrated that the leukaemic cells contained an MLL translocation. This is the first detailed report, to our knowledge, of fetal death due to acute leukaemia, and directly demonstrates oncogenesis in utero.

Source: EMBASE

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Available in **fulltext** at [EBSCOhost](https://www.ebscohost.com)

Available in **print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.**
51. Anaesthetic management of caesarean section in a parturient with acute myelodysplastic syndrome

Author(s): Christiaens F., Burrini D., Verborgh C., Fontaine N., De Catte L., Camu F.

Citation: International Journal of Obstetric Anesthesia, October 1997, vol./is. 6/4(270-273), 0959-289X (Oct 1997)

Publication Date: October 1997

Abstract: A 34-year-old pregnant woman developed a myelodysplastic syndrome during pregnancy which resulted in a refractory anaemia and an extreme thrombocytopenia. The report describes the anaesthetic management of elective caesarean section and successful childbirth in this patient. Following replacement therapy with packed red cells and platelets, general anaesthesia was used for the procedure.

Source: EMBASE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

52. Fetal growth in maternal anaemia.

Author(s): Singla PN, Tyagi M, Kumar A, Dash D, Shankar R

Citation: Journal of Tropical Pediatrics, April 1997, vol./is. 43/2(89-92), 0142-6338;0142-6338 (1997 Apr)

Publication Date: April 1997

Abstract: The effect of maternal iron deficiency anemia on fetal growth was studied in 54 anaemic (haemoglobin < 11.0 g/dl) mothers. Twenty-two mothers served as controls (haemoglobin > or = 11.0 g/dl). All the women had singleton live births at term gestation. The maternal iron status was assessed by serum ferritin estimation. The birth weight, head circumference, chest circumference, mid-arm circumference, and crown heel length were significantly low in infants born to women with moderate (haemoglobin 6.1 +/- 8.5 g/dl) and severe anaemia (haemoglobin < or = 6.0 g/dl), in comparison to infants born to non-anaemic women. Similarly, birth weight, mid-arm circumference, and crown-heel length were significantly low in infants of women with depleted iron stores (serum ferritin < 10 micrograms/l) than in infants of women with serum ferritin levels of 20 micrograms/l or more. All indices of fetal growth showed linear relationships with maternal haemoglobin, as well as with serum ferritin. The growth retarding effect of maternal anaemia was more on fetal birth weight and mid-arm circumference than on other anthropometric indices of the newborn.

Source: MEDLINE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

53. Severe anemia due to Kell alloimmunization.

Author(s): Giannacopoulou CH, Relakis K, Kalmanti M

Citation: Haematologia, 1997, vol./is. 28/3(173-5), 0017-6559;0017-6559 (1997)

Publication Date: 1997

Abstract: A case of alloimmunization in pregnancy caused by antibody to Kell red blood cell antigen is described. The baby was born prematurely with severe anaemia (HB 3g/dL). He was the 5th child of the family. The mother, who was found blood group O, Rh D positive, received at the age of 18 years a blood transfusion. This case emphasizes the importance of serological screening for low frequency red cell antigens, particularly in the case of a positive indirect Coomb's test in Rh positive pregnant mothers.

Source: MEDLINE
54. [A case of pregnancy complicated with myelodysplastic syndrome].

Author(s): Okada M, Takahashi K, Kurioka H, Kitao M

Citation: Nippon Sanka Fujinka Gakkai Zasshi - Acta Obstetrica et Gynaecologica Japonica, June 1996, vol./is. 48/6(423-6), 0300-9165;0300-9165 (1996 Jun)

Publication Date: June 1996

Source: MEDLINE

55. Meta-analysis of efficacy and tolerability data on iron proteinsuccinylate in patients with iron deficiency anemia of different severity.

Author(s): Kopcke W, Sauerland MC

Citation: Arzneimittel-Forschung, November 1995, vol./is. 45/11(1211-6), 0004-4172;0004-4172 (1995 Nov)

Publication Date: November 1995

Abstract: Iron proteinsuccinylate (ITF 282, CAS 93615-44-2) is an iron derivative for the oral treatment of iron deficiency anemia. Its efficacy and tolerability have been proved in about 1800 patients, enrolled in 3 multicenter clinical trials. The first aim of this meta-analysis is to verify the increase of hemoglobin (Hb) in these patients (891 treated with ITF282, 644 treated with iron sulphate and 236 treated with iron-polysterene sulphonate).

The 3 studies show homogeneous Hb increases. ITF 282 appeared to provide, from time 0 to the 30th day of treatment, a similar or lesser increase in Hb in comparison to the reference drugs, while from the 30th day of treatment to the 60th day its efficacy was always greater than that of the reference medications. The data have been further analyzed by subdividing the patients in three classes, according to the severity of the anemia: basal Hb < or = 9 g/dl, > 9 < or = 11 g/dl, > g/dl. During the 60-day treatment, both ITF 282 and the reference drugs induced the most significant increase in Hb in the patients affected by the most severe anemia. The meta-analytic evaluation of the 3 trials results has been extended to tolerability data. Most side effects were related to the gastrointestinal tract. Their incidence resulted significantly lower for ITF 282 than that for the reference drugs (9.4% vs. 20.4%, p < 0.01). The comparative sub-analysis of the side effect distribution into the patients populations shows that ITF 282 is definitely better tolerated in pregnant women (relative risk 0.321, p < 0.01). The time course of Hb increases and the tolerability data suggest a different mechanism by which ITF 282 and the reference drugs are effective. Since the main difference between ITF 282 and the reference drugs is the form in which the iron is presented to the gastrointestinal mucosa, it may be supposed that the reference drugs, providing free divalent iron ions for absorption, could induce some kind of irritative condition of the gastrointestinal mucosa, which results in a reduced long-term absorption capacity, as well as in a higher incidence of gastroenteric adverse events. ITF 282, providing protein-bound iron, would not permit the process supposed with divalent iron, thus resulting in prolonged absorption capacity (that is higher hemoglobin recovery) and higher gastrointestinal tolerability.

Source: MEDLINE

56. Leukemia during pregnancy.

Author(s): Ramirez-Smiley M, Ingle B
Purpose/Objective: To review the literature on pregnancy and leukemia and present a case report that describes the effects of cancer treatment on a developing fetus.

Data sources: Published articles, book chapters, personal observation. Data synthesis: A diagnosis of acute myelogenous leukemia requires urgent initiation of intensive treatment. During pregnancy, chemotherapy treatment is determined by gestational development and the woman's general health status. Conclusions: Babies born to leukemic mothers treated after the first trimester rarely are affected by the disease. Meticulous medical and nursing management is critical to ensure that treatment and side effects do not adversely affect the baby or the patient. Implications for nursing practice: Goals of care are to prevent bleeding, infection, injury, and premature delivery; to assist the patient and family in coping with a new diagnosis, alteration in role performance, and body image changes, and to maintain adequate nutritional status.

Source: CINAHL

Abstract: A 22-year-old woman was referred to our hospital because of severe anemia in the 20th week of gestation. Acute myelogenous leukemia was diagnosed and she was treated with multiple-agent chemotherapy in the second and third trimester. Although the patient tolerated the intensive treatment, an intermittent sinusoidal fetal heart rate pattern was detected during chemotherapy. Complete remission was achieved at the 35th week of gestation. An underweight baby boy, suffering from pancytopenia, was delivered by cesarean section at 36 weeks' gestation. The baby recovered well and had adequate growth. No abnormalities were found at examination two months after birth. The fetal sinusoidal heart rate pattern may have been induced by severe anemia due to myelosuppression caused by the transplacental receipt of chemotherapeutic agents.

Source: EMBASE

Abstract: OBJECTIVE: To assess the value of ultrasonography and Doppler to predict the severity of fetal haemolytic anaemia. DESIGN: Ultrasonographic measurements of the fetal liver, spleen, umbilical vein and placenta, and Doppler measurements of umbilical venous and fetal aorta flow velocities were performed before the first intrauterine blood transfusion. Multivariate regression models for the prediction of the fetal haemoglobin level were derived from the measurements. SETTING: National referral centre for management of alloimmunised pregnancies. SUBJECTS: Forty fetuses in 39 severe red cell alloimmunised pregnancies. RESULTS: A logistic regression model, incorporating the two Doppler...
parameters only, predicted the presence or absence of severe anaemia in nonhydropic fetuses with an accuracy of 90%. Positive predictive value was 89% and negative predictive value was 100%. CONCLUSION: In severe red cell alloimmunised pregnancies, Doppler blood flow velocity studies can be used to predict the severity of fetal anaemia. This may lead to a reduction of invasive diagnostic tests, to more accurate timing of intrauterine transfusions, and thus to a higher survival rate.

**Source:** MEDLINE

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**Author(s):** Morishita S, Imai A, Kawabata I, Tamaya T

**Citation:** International Journal of Gynaecology & Obstetrics, March 1994, vol./is. 44/3(273-7), 0020-7292;0020-7292 (1994 Mar)

**Publication Date:** March 1994

**Abstract:** This report documents the acute toxicity of anti-leukemic chemotherapy on the fetus in utero by umbilical blood sampling. A patient with acute myelocytic leukemia diagnosed at the 23rd week of gestation received combination chemotherapy, and carried the pregnancy to successful delivery at the 34th week. During the course of pregnancy, the fetal condition was evaluated by serial real time sonograms and umbilical blood sampling through cordocentesis. Fetal hematopoiesis was preserved against maternal chemotherapeutic agents, and no developmental abnormalities were observed. This is the first attempt to evaluate the acute effects of chemotherapeutic agents on the fetus in utero by real time umbilical cord sampling.

**Source:** MEDLINE

**Full Text:**

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60. Hematologic malignancies and pregnancy

**Author(s):** Escudier S.M., Keating M.J.

**Citation:** Cancer Bulletin, 1994, vol./is. 46/5(418-423), 0740-820X (1994)

**Publication Date:** 1994

**Abstract:** PREGNANCY is infrequently complicated by hematologic malignancies. For an asymptomatic patient with chronic leukemia or indolent lymphoma, treatment can be deferred until after delivery of the baby. Leukapheresis will deplete leukemic cells, relieve systemic symptoms, and reduce splenomegaly in patients with chronic myelogenous leukemia. With acute leukemias, chemotherapy is often required to preserve the life of the mother and fetus. When the mother is induced into remission, the likelihood of safe delivery of the child is enhanced. In patients with stage I or II Hodgkin's or non- Hodgkin's lymphoma who require treatment during pregnancy, supradiaphragmatic radiotherapy with abdominal shielding can be used with minimal risk to the fetus. In patients with more advanced lymphoma, organ involvement, or high- grade histology, combination chemotherapy may be necessary to save the life of the mother. In this review, we discuss the complications of these malignancies, along with the side effects of chemotherapeutic drugs.

**Source:** EMBASE

61. Anemia in pregnancy.

**Author(s):** Williams MD, Wheby MS

**Citation:** Medical Clinics of North America, May 1992, vol./is. 76/3(631-47), 0025-
Abstract: In evaluating pregnant women with anemia, it is essential to do a complete history and physical examination, as well as a complete blood count with indices and a blood smear examination. Based on these findings, other tests such as ferritin and serum or red cell folate may be ordered. Because of the normal physiologic changes in pregnancy that affect the hematocrit, indices, and some other parameters, diagnosing true anemia, as well as the etiology of anemia, is challenging. Because of the increased nutritional requirements of the mother and fetus, the most common anemias are iron deficiency anemia and folate deficiency megaloblastic anemia. These anemias are more common in women who have inadequate diets and who are not receiving prenatal iron and folate supplements. Other less common causes of acquired anemia in pregnancy are aplastic anemia and hemolytic anemia associated with preeclampsia. In addition, congenital anemias such as sickle cell disease can impact on the health of the mother and fetus. Obviously, severe anemia has adverse effects on the mother and the fetus. There is also evidence that less severe anemia is associated with poor pregnancy outcome. The cause of this association has yet to be elucidated. It is important, however, to diagnose and treat anemia in pregnancy to provide for optimal health of the mother and infant.

Source: MEDLINE

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62. Myelodysplastic syndromes during pregnancy
Author(s): Pagliuca A., Mufti G.J., Fenaux P., de Silva C., Samaratunga I.
Citation: European journal of haematology, October 1991, vol./is. 47/4(310-312), 0902-4441 (Oct 1991)
Publication Date: October 1991
Source: EMBASE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

63. Multiple myeloma in pregnancy
Author(s): Pajor A., Kelemen E., Mohos Z., Hambach J., Varadi G.
Publication Date: 1991
Abstract: This is a report on pregnancy complicated by multiple myeloma. Severe refractory anemia was present throughout the pregnancy and multiple myeloma was diagnosed in the second trimester. The anemia ceased after delivery but recurred one year later along with other signs of disease progression. The infant remained healthy after a 2-year follow-up.
Source: EMBASE

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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

64. Myelodysplastic syndromes presenting in pregnancy. A report of five cases and the clinical outcome
Author(s): Siddiqui T., Elfenbein G.J., Noyes W.D., Moreb J.S., Oblon D., Weiner R.S.
Cancer, 1990, vol./is. 66/2(377-381), 0008-543X (1990)

Abstract: Five female patients, ranging in age between 22 and 36 years, presented with myelodysplastic syndromes during pregnancy between June 1982 and March 1987. Three of these five cases evolved into acute leukemia. A bone marrow transplant was attempted in the fourth. It is suggested that the association of myelodysplastic syndromes during pregnancy is more than coincidental and that acute leukemia evolves in a majority of these cases. Furthermore, refractory macrocytic anemias in pregnancy need to be carefully evaluated for a primary myelodysplastic state.

Source: EMBASE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

65. Acute leukemia during pregnancy. Association with immune-mediated thrombocytopenia in mother and infant

Author(s): Gondo H., Hamasaki Y., Nakayama H., Kondo T., Mitsuuchi J., Kawaga Y., Taniguchi S., Harada M., Niho Y.

Citation: Acta Haematologica, 1990, vol./is. 83/3(140-144), 0001-5792 (1990)

Abstract: A 29-year-old female in the 20th week of pregnancy was admitted because of a change in the ABO blood group and bleeding tendency. Acute myelogenous leukemia was diagnosed with a weak reaction of red blood cells with anti-A antibody and a decreased level of A-transferase activity. Though the patient tolerated intensive chemotherapy and achieved complete remission, thrombocytopenia persisted after consolidation chemotherapy. Since platelet-associated IgG was elevated, thrombocytopenia was considered to be immune-mediated. In the third trimester, premature separation of the normally implanted placenta developed and cesarean section was performed. The male baby was also thrombocytopenic, but successfully treated with -globulin.

Source: EMBASE

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66. Acute myelogenous leukemia developing in pregnancy with complete remission--a case report

Author(s): Fukuoka K., Nishikawa K., Mizumoto Y., Shimoyama T., Mikasa K., Sawaki M., Narita N., Kato Y., Tsuzi Y., Moriyma I.

Citation: [Rinsho ketsueki] The Japanese journal of clinical hematology, October 1989, vol./is. 30/10(1859-1864), 0485-1439 (Oct 1989)

Abstract: A 27-year-old woman was admitted to our hospital complaining of purpuras and legs’ edema in the 38th week of pregnancy. On admission, the hemoglobin was 7.8 g/dl, platelets 20,000/microliter and WBC 6,600/microliters with 52% blast cells. Bone marrow aspirate demonstrated 77.2% myeloblasts with prominent Auer rods, consistent with acute myelogenous leukemia. Receiving packed-red-cell and platelet transfusions, she delivered a normal male infant in the 39th week of pregnancy by normal labor. After delivery, she was placed on a combination chemotherapy of BHAC-MMP, subsequently DNR added. Four weeks later, a complete remission was obtained, lasting for almost one year, and her child has grown well without hematological disorder. Microscopic findings of the placenta obtained at delivery revealed no invasion of leukemic cells, but 9% blast cells were present in the placental cord blood. We reviewed 18 cases reported in Japan of acute leukemia in gestational period, that could obtain complete remission and keep the children growing well. Placental transmission of leukemic cells from mother to infant was discussed.
67. Acute myelogenous leukemia in pregnancy

**Author(s):** D'Emilio A., Dragone P., De Negri G., Montaldi A., Stella M., Battista R.

**Citation:** Haematologica, 1989, vol./is. 74/6(601-604), 0390-6078 (1989)

**Publication Date:** 1989

**Source:** EMBASE

**Full Text:**

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

68. Myelodysplastic syndrome in pregnancy with hematological improvement following delivery

**Author(s):** Furukawa Y., Enomoto M., Sato Y., Yoshida M., Sakamoto S., Miura Y.

**Citation:** Nippon Ketsueki Gakkai zasshi : journal of Japan Haematological Society, February 1988, vol./is. 51/1(76-80), 0001-5806 (Feb 1988)

**Publication Date:** February 1988

**Source:** EMBASE

**Full Text:**

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

69. Acute myelogenous leukemia: current status of therapy in adults

**Author(s):** Foon K.A., Gale R.P.

**Citation:** Recent results in cancer research. Fortschritte der Krebsforschung. Progres dans les recherches sur le cancer, 1984, vol./is. 93/(216-239), 0080-0015 (1984)

**Publication Date:** 1984

**Source:** EMBASE

**Full Text:**

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

70. Acute myelogenous leukemia in pregnancy

**Author(s):** Cantini E., Yanes B.

**Citation:** Southern Medical Journal, 1984, vol./is. 77/8(1050-1052), 0038-4348 (1984)

**Publication Date:** 1984

**Abstract:** The experience with acute myelogenous leukemia treated with newer chemotherapeutic agents during pregnancy is limited. We have reported the case of a mother treated during the 24th week of pregnancy, and her infant delivered in the 29th week. At 14 months the infant is of low height and weight, but has a normal head circumference and developmental parameters.

**Source:** EMBASE

**Full Text:**

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.
71. **Acute myelogenous leukaemia in pregnancy**

**Author(s):** Van der Velden J., Lammes F.B., Sint Nicolaas K.

**Citation:** Nederlands Tijdschrift voor Geneeskunde, 1983, vol./is. 127/18(774-778), 0028-2162 (1983)

**Publication Date:** 1983

**Abstract:** The cases are discussed of two women in whom acute myelogenous leukaemia manifested itself during pregnancy. The pregnancy of one patient who at first was not given chemotherapeutic treatment ended in intrauterine death. The other patient received chemotherapeutic treatment from the 32nd week of pregnancy. A normal infant was delivered after an uncomplicated pregnancy. It may be concluded on theoretical grounds and from data in the literature that in acute myelogenous leukaemia of a pregnant woman, the interests of mother and child are best served by immediate institution of chemotherapy. Treatment with cytostatics may sometimes be teratogenous during the first trimester but not in the second and third trimesters. It is recommended to terminate the pregnancy during the first trimester, but to preserve it during the second and third trimesters.

**Source:** EMBASE

**Full Text:** Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

72. **A case of acute myelogenous leukemias occurring during the second trimester of pregnancy (author's transl)**

**Author(s):** Tsumoto S., Ohyabu H., Sueyoshi K., Kageyama T.

**Citation:** [Rinsho ketsueki] The Japanese journal of clinical hematology, November 1981, vol./is. 22/11(1737-1742), 0485-1439 (Nov 1981)

**Publication Date:** November 1981

**Source:** EMBASE

**Full Text:** Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

73. **Acute myelogenous leukaemia with bilateral mammary gland involvement**

**Author(s):** O'Donnell J.R., Farrell M.A.

**Citation:** Journal of Clinical Pathology, 1980, vol./is. 33/6(547-551), 0021-9746 (1980)

**Publication Date:** 1980

**Abstract:** A 34-year-old woman developed acute myelogenous leukaemia in the course of pregnancy and, after delivery of a normal baby, developed multiple bilateral breast masses composed of myelogenous tissue.

**Source:** EMBASE

**Full Text:** Available in fulltext at Highwire Press

Available in fulltext at Highwire Press

Available in fulltext at National Library of Medicine

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

74. **[A case of acute myelogenous leukemia (AML) in 10 years course of thrombocytopenia (ITP) with episodes of splenectomy and of delivery (author's transl)].**
75. Consequences of acute myelogenous leukemia in early pregnancy.

Author(s): Lilleyman JS, Hill AS, Anderton KJ

Citation: Cancer, September 1977, vol./is. 40/3(1300-3), 0008-543X;0008-543X (1977 Sep)

Publication Date: September 1977

Abstract: Cytarabine and thioguanine therapy for acute myelomonocytic leukemia initiated in the tenth week of pregnancy (with the addition of vincristine and rubidomycin at 17 weeks) led to a short complete remission of the leukemia in a 24-year-old primigravida. This is the first case to be reported in which cytarabine was administered in the first trimester and a prostaglandin termination of pregnancy performed at 20 weeks produced an apparently normal fetus. A review of the literature suggests a slightly less than 50% chance of producing a live healthy baby if acute myelogenous leukemia is diagnosed in the first half of pregnancy, with materna mortality approaching 100% by six months postpartum. Current therapy may improve these figures.

Source: MEDLINE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

76. Successful treatment of acute leukemia during pregnancy. Combination therapy in the third trimester.

Author(s): Durie BG, Giles HR

Citation: Archives of Internal Medicine, January 1977, vol./is. 137/1(90-1), 0003-9926;0003-9926 (1977 Jan)

Publication Date: January 1977

Abstract: Aggressive treatment with cytarabine, vincristine sulfate, and prednisone for acute myelogenous leukemia, administered from the 31st week of pregnancy, resulted in both sustained complete remission of the leukemia and delivery of a normal infant with a normal birthweight and a normal male karyotype. It is concluded that chemotherapy with cytarabine combinations can be administered in the third, and probably the second, trimester of pregnancy without risk of serious damage to the developing fetus.

Source: MEDLINE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

77. Acute leukemia during reproductive life: its course, complications and sequelae for fertility.

Author(s): Bitran JD, Roth DG

Citation: Journal of Reproductive Medicine, October 1976, vol./is. 17/4(225-31), 0024-7758;0024-7758 (1976 Oct)
Abstract: Acute leukemia is less common during the reproductive years than in children or in post-menopausal women. Effective chemotherapy exists for adult lymphocytic leukemia, and the median survival is 18 to 20 months. Acute myelogenous leukemia still has a less favorable prognosis, with a median survival of 12 months despite effective chemotherapeutic agents. The occurrence of acute leukemia in pregnancy does not change the overall prognosis, which depends primarily on the cytopathologic types. If leukemia occurs during the first trimester, therapeutic abortion is advised since the rate of spontaneous abortion after chemotherapy is high in the first trimester and fetal malformations are common. Acute leukemia can be treated in the second and third trimesters with little effect on the pregnancy or fetus. In patients cured of acute leukemia, the potential for subsequent pregnancies exists with little likelihood of increases in fetal malformations.

Source: MEDLINE

78. Refractory anaemia of pregnancy as an expression of zinc deficiency

Author(s): Jameson S.

Citation: Acta medica Scandinavica. Supplementum, 1976, vol./is. 593/(65-76), 0365-463X (1976)

Publication Date: 1976

Abstract: Thirty-three gravidae with anaemia in spite of iron and vitamin supplementation were examined, and 31 were found to have low or very low serum zinc concentrations with regard to the week of gestation. Twenty-three of the 33 showed no bone marrow haemosiderin or only traces. Thirty showed moderate or great increase in intracellular cell debris in the bone marrow macrophages, indicating an increase in intramedullary cell destruction. Two women showed low serum vitamin B-12 or folate concentrations and they also showed lowest zinc concentrations recorded in the series. Twelve of the 33 women gave birth to mature infants by normal delivery; 21 developed complications during labour or gave birth to immature, dysmature, or, in one case, malformed infants and/or were not delivered at normal term. Low serum zinc in pregnant women increases maternal morbidity and involves a higher risk to the fetus. It is suggested that an aetiological relationship exists between low serum zinc concentrations and refractory anaemia of pregnancy resulting in increased intramedullary cell destruction. This effect might be aggravated by iron deficiency.

Source: EMBASE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.
81. Primary refractory anaemia and pregnancy

Author(s): Taylor J.J., Studd J.W., Green I.D.

Citation: The Journal of obstetrics and gynaecology of the British Commonwealth, September 1968, vol./is. 75(963-968), 0022-3204 (Sep 1968)

Publication Date: September 1968

Source: EMBASE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

82. Refractory anemias of pregnancy

Author(s): HOLLY R.G.

Citation: American journal of obstetrics and gynecology, November 1960, vol./is. 80/(946-955), 0002-9378 (Nov 1960)

Publication Date: November 1960

Source: EMBASE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

83. Reversible refractory anemia in pregnancy

Author(s): KYSER F.A., DANFORTH D.N.

Citation: JAMA : the journal of the American Medical Association, October 1960, vol./is. 174/(485-488), 0098-7484 (1 Oct 1960)

Publication Date: October 1960

Source: EMBASE

Full Text: Available in fulltext at Highwire Press.

84. Primary refractory anemia complicating pregnancy and delivery

Author(s): ROVINSKY J.J.

Citation: Obstetrical & gynecological survey, April 1959, vol./is. 14/2(149-170), 0029-7828 (Apr 1959)

Publication Date: April 1959

Source: EMBASE

Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

85. Severe refractory anaemia in pregnancy

Author(s): LACHMANN A., LUND E., VINTHERPAULSEN N.
Some additional results

1. Anemia treatment with erythropoietin in pregnant renal recipients

Author(s): Cyganek A., Pietrzak B., Kociszewska-Najman B., Sanko-Resmer J., Paczek L., Wielgos M.

Citation: Transplantation Proceedings, October 2011, vol./is. 43/8(2970-2972), 0041-1345;1873-2623 (October 2011)

Publication Date: October 2011

Abstract: Pregnanacies in renal transplant patients are considered to be high risk. Anemia is one of the major complications of pregnancy occurring among 65% to 85% of cases in this setting, especially since these patients carry additional risk factors. Herein we have presented five renal transplant recipients who were women who were treated with human recombinant erythropoietin due to severe anemia that developed during pregnancy. Hemoglobin levels below 9 g/dL after 3 weeks of oral iron administration were assumed to be qualifying criteria for erythropoietin treatment. No complication was observed to be associated with the treatment. Two of the five patients required blood transfusions despite erythropoietin administration. Two cases delivered small for gestational fetus age. Erythropoietin therapy in pregnant kidney transplant recipients should be considered to be a safe method to reduce the need for blood transfusions.

Source: EMBASE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

2. Successful outcome of gestation in a young woman with severe oesophageal varices throughout the pregnancy

Author(s): Shamim S., Nasrin B., Chowdhury S.B.

Citation: Mymensingh medical journal: MMJ, April 2011, vol./is. 20/2(323-325), 1022-4742 (Apr 2011)

Publication Date: April 2011

Abstract: During normal pregnancy there is an increase in the maternal blood volume leading to portal hypertension with some changes in liver functions. However, in an
apparently healthy woman without known liver cirrhosis or other advanced liver disease, severe oesophageal varices with along with repeated variceal bleeding during pregnancy is rare. In this paper we described a case of severe oesophageal variceal bleeding in a young woman without having any pre-existing liver pathology. Due to repeated pregnancy with short interval bleeding the patient developed severe anaemia. Packed cell transfusion was done repeatedly and oesophageal variceal ligation (EVL) was done three times. In spite of these measures variceal bleeding continued and patient's condition was deteriorating progressively; so caesarean section was at 33rd week of gestation and a preterm but healthy baby was delivered. The puerperium was uneventful with no haematemesis and there was gradual improvement of the condition. A brief review of the literature on pregnancy with oesophageal varices is also presented.

Source: EMBASE

Full Text:

3. Treatments for iron-deficiency anaemia in pregnancy

Author(s): Reveliz L., Gyte G.M., Cuervo L.G., Casasbuenas A.

Citation: Cochrane database of systematic reviews (Online), 2011, vol./is. /10(CD003094), 1469-493X (2011)

Publication Date: 2011

Abstract: Iron deficiency, the most common cause of anaemia in pregnancy worldwide, can be mild, moderate or severe. Severe anaemia can have very serious consequences for mothers and babies, but there is controversy about whether treating mild or moderate anaemia provides more benefit than harm. To assess the effects of different treatments for anaemia in pregnancy attributed to iron deficiency (defined as haemoglobin less than 11 g/dL or other equivalent parameters) on maternal and neonatal morbidity and mortality. We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (7 June 2011), CENTRAL (2011, Issue 5), PubMed (1966 to June 2011), the International Clinical Trials Registry Platform (ICTRP) (2 May 2011), Health Technology Assessment Program (HTA) (2 May 2011) and LATINREC (Colombia) (2 May 2011). Randomised controlled trials comparing treatments for anaemia in pregnancy attributed to iron deficiency. We identified 23 trials, involving 3,198 women. We assessed their risk of bias. Three further studies identified are awaiting classification. Many of the trials were from low-income countries; they were generally small and frequently methodologically poor. They covered a very wide range of differing drugs, doses and routes of administration, making it difficult to pool data. Oral iron in pregnancy showed a reduction in the incidence of anaemia (risk ratio 0.38, 95% confidence interval 0.26 to 0.55, one trial, 125 women) and better haematological indices than placebo (two trials). It was not possible to assess the effects of treatment by severity of anaemia. A trend was found between dose and reported adverse effects. Most trials reported no clinically relevant outcomes nor adverse effects. Although the intramuscular and intravenous routes produced better haematological indices in women than the oral route, no clinical outcomes were assessed and there were insufficient data on adverse effects, for example, on venous thrombosis and severe allergic reactions. Daily low-dose iron supplements may be effective at treating anaemia in pregnancy with less gastrointestinal side effects compared with higher doses. Despite the high incidence and burden of disease associated with this condition, there is a paucity of good quality trials assessing clinical maternal and neonatal effects of iron administration in women with anaemia. Daily oral iron treatment improves haematological indices but causes frequent gastrointestinal adverse effects. Parenteral (intramuscular and intravenous) iron enhances haematological response, compared with oral iron, but there are concerns about possible important adverse effects (for intravenous treatment venous thrombosis and allergic reactions and for intramuscular treatment important pain, discoloration and allergic reactions). Large, good quality trials, assessing clinical outcomes (including adverse effects) as well as the effects of treatment by severity of anaemia are required.

Source: EMBASE

Full Text:
4. Anaemia and pregnancy: Anaesthetic implications

Author(s): Grewal A.

Citation: Indian Journal of Anaesthesia, September 2010, vol./is. 54/5(380-386), 0019-5049 (September - 2010)

Publication Date: September 2010

Abstract: Anaemia in pregnancy defined as haemoglobin (Hb) level of < 10 gm/dL, is a qualitative or quantitative deficiency of Hb or red blood cells in circulation resulting in reduced oxygen (O₂)-carrying capacity of the blood. Compensatory mechanisms in the form of increase in cardiac output (CO), PaO₂, 2,3 diposphoglycerate levels, rightward shift in the oxygen dissociation curve (ODC), decrease in blood viscosity and release of renal erythropoietin, get activated to variable degrees to maintain tissue oxygenation and offset the decreases in arterial O₂ content. Parturients with concomitant medical diseases or those with acute ongoing blood losses may get decompensated, leading to serious consequences like right heart failure, angina or tissue hypoxemia in severe anaemia. Preoperative evaluation is aimed at assessing the severity and cause of anaemia. The concept of an acceptable Hb level varies with the underlying medical condition, extent of physiological compensation, the threat of bleeding and ongoing blood losses. The main anaesthetic considerations are to minimize factors interfering with O₂ delivery, prevent any increase in oxygen consumption and to optimize the partial pressure of O₂ in the arterial blood. Both general anaesthesia and regional anaesthesia can be employed judiciously. Monitoring should focus mainly on the adequacy of perfusion and oxygenation of vital organs. Hypoxia, hyperventilation, hypothermia, acidosis and other conditions that shift the ODC to left should be avoided. Any decrease in CO should be averted and aggressively treated.

Source: EMBASE

Full Text:
Available in fulltext at National Library of Medicine

5. Autoimmune hemolytic anemia in pregnancy

Author(s): Ong M.G., Hawthorne L.M.

Citation: Laboratory Medicine, May 2010, vol./is. 41/5(264-266), 0007-5027 (May 2010)

Publication Date: May 2010

Abstract: Patient: 26-year-old female Past Medical History: Patient had a history of chronic hypertension (BP 132/78). She was not on any antihypertensive medication (such as Aldomet). On her initial crossmatch, she tested O positive with negative antibody screens and 2 immediate spin compatible red cells units were transfused. Two subsequent specimens submitted 3 and 5 days later tested the same, and no transfusions were necessary. Three weeks later, on a prenatal visit at 20 weeks gestation of her latest pregnancy, she presented with shortness of breath, fatigue, and dizziness and was found to be severely anemic (hemoglobin 5 g/dL, baseline 11 g/dL). She received blood transfusions at an outside institution and was subsequently transferred to our institution for further management. Initial laboratory results are shown below (Table 1). She was type O Rh positive with detectable anti-E, a strong panagglutinating warm autoantibody, and a history (from the sending hospital) of anti-C and -K. Phenotypically matched red blood cells negative for C, E, K, Fy(a), and S antigens were transfused. Serologic tests for HIV, HBsAg, and RPR were negative. Culture for Group B strep (Streptococcus agalactiae) was negative, and Chlamydia/gonorrhea was not detected. She was transfused with a total of 10 additional red cell units and was placed on high-dose intravenous steroids, which was later shifted to an oral preparation. Her other medications included prenatal vitamins and iron. She was poorly compliant with the steroid treatment, and due to severe anemia she required 3 hospitalizations during the pregnancy. She delivered a preterm male infant at 36 weeks gestation by normal spontaneous delivery 2 months later. During labor she was
mildly pre-eclamptic and was given magnesium sulfate. The infant had good Apgar scores (8 and 9 at 1 and 5 minutes respectively) and was not jaundiced or anemic. He was type O Rh positive with a positive DAT. Elution studies were positive for the maternal warm autoantibody only. He was admitted to the newborn nursery, and on the second day of life he was noted to have mild abdominal distension with a slight drop of his temperature (from 97°F at birth to 96.4°F). As a result a possible infection was suspected. Blood cultures were obtained, and antibiotics were initiated. The abdominal distention subsequently resolved. His blood cultures were negative, hemoglobin remained stable at 16 g/dL (reference interval 13.5-19.5 g/dL), and no jaundice was observed. He was discharged from the hospital after a week of antibiotic treatment in stable condition. The mother had 3 subsequent transfusion episodes totaling 9 red cell units over the following 8 months. Principal Laboratory Findings: Table 1.

Source: EMBASE

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6. In utero treatment of severe fetal anaemia due to parvovirus B19 in one fetus in a twin pregnancy - A case report and literature review

Author(s): Bekhit M.T., Greenwood P.A., Warren R., Aarons E., Jauniaux E.

Citation: Fetal Diagnosis and Therapy, August 2009, vol./is. 25/1(153-157), 1015-3837 (August 2009)

Publication Date: August 2009

Abstract: Background: Parvovirus B19 (PVB19) is a well-established cause of nonimmune hydrops fetalis and fetal anaemia in pregnancy. However, discordant viral infection of only 1 fetus in a twin pregnancy is a rare occurrence. Case Report: A 40-year-old female with dichorionic, diamniotic twin pregnancy presented at 22 weeks with fetal hydrops and severe anaemia in 1 twin. Maternal PVB19 infection was confirmed, and the affected fetus was treated with a single intrauterine transfusion. The only subsequent complication developed was that the affected fetus was growing on the 5th centile. The affected twin continued to grow, and 2 live twins were delivered by caesarean section at 36 weeks. By 18 months of age, the affected twin had normal development. Conclusion: PVB19 may selectively affect 1 fetus in a dichorionic, diamniotic twin pregnancy and may be treated efficiently with intrauterine transfusion. Discordant viral infection in this case suggests that the viral load may be limited to 1 placenta and/or that different individual immunological fetal response starts very early in utero. Copyright 2009 S. Karger AG.

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Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

7. Selective use of recombinant human erythropoietin in pregnant patients with severe anemia or nonresponsive to iron sucrose alone

Author(s): Krafft A., Bencaiova G., Breymann C.

Citation: Fetal Diagnosis and Therapy, August 2009, vol./is. 25/2(239-245), 1015-3837 (August 2009)

Publication Date: August 2009

Abstract: Objective: To evaluate the effectiveness of a stepwise use of recombinant human erythropoietin (rhEPO) in pregnant patients with severe anemia or nonresponsive to intravenously administered iron only. Methods: All subjects had iron deficiency anemia, i.e., a hemoglobin (Hb) level <10.0 g/dl and ferritin <=15 mug/l. Patients with an Hb level >=9.0 g/dl and <10.0 g/dl received 200 mg iron sucrose intravenously twice weekly. If response to therapy was poor, patients additionally received 10,000 U rhEPO twice weekly. Patients with an Hb level <9.0 g/dl primarily received iron sucrose and rhEPO likewise. Results: Of
the 84 patients, 59 had a baseline Hb level between 9.0 and 9.9 g/dl, of whom 32 responded poorly, thus receiving additional rhEPO. Twenty-five patients had a baseline Hb level <9.0 g/dl. The overall Hb level after therapy was 11.0 g/dl (+/-0.5, range 10.0-12.6 g/dl). Mean duration of therapy was 3.5 weeks (7 infusions). Conclusion: This study shows an effective treatment regimen for patients with various degrees of anemia in pregnancy. Iron sucrose is a safe and effective treatment option. In cases of severe iron deficiency anemia or poor response to parenteral iron therapy additional administration of rhEPO might be considered. However, the mechanism for not responding to intravenous iron therapy despite iron deficiency anemia still remains unclear to a large extent. Copyright 2009 S. Karger AG.

**Source:** EMBASE

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8. **Increasing the noninvasive management of rhesus isoimmunization**

**Author(s):** Papantoniou N., Daskalakis G., Anastasakis E., Marinopoulos S., Mesogitis S., Antsaklis A.

**Citation:** International Journal of Gynecology and Obstetrics, June 2008, vol./is. 101/3(281-284), 0020-7292 (Jun 2008)

**Publication Date:** June 2008

**Abstract:** Objective: To determine the clinical outcome of isoimmunized pregnancies managed by middle cerebral artery peak systolic velocity (MCA-PSV) in an intention-to-treat study. Method: Rhesus isoimmunized pregnancies were managed with serial ultrasound and Doppler studies at 7-day intervals up to 34 weeks of gestation, between 2001 and 2005. Invasive diagnostic and therapeutic procedures were carried out when MCA-PSV was indicative of moderate or severe anemia. Results: The overall sensitivity in detecting moderate to severe fetal anemia at less than 34 weeks was 100% (95% confidence interval, 54.1-100.0 L). Twenty-two cases were managed with MCA-PSV. Twelve cases needed fetal blood sampling and 6 cases needed intrauterine transfusion. Cordocentesis revealed a hematocrit of more than 26% in 6 fetuses. Conclusion: Management by MCA-PSV Doppler at weekly intervals is a highly sensitive method for detecting fetal anemia. It reduces the number of fetal blood samples needed and significantly lowers interventional procedures. 2008 International Federation of Gynecology and Obstetrics.

**Source:** EMBASE

**Full Text:**
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9. **Cardiofemoral index as an ultrasound marker of fetal anemia in isoimmunized pregnancy**

**Author(s):** Cabral A.C.V., Reis Z.S.N., Leite H.V., Lage E.M., Ferreira A.L.P., Melo I.G.

**Citation:** International Journal of Gynecology and Obstetrics, January 2008, vol./is. 100/1(60-64), 0020-7292 (Jan 2008)

**Publication Date:** January 2008

**Abstract:** Objective: To test a new noninvasive ultrasound method for diagnosing fetal anemia in red blood cell isoimmunized pregnancies. Methods: A diagnostic accuracy study was carried out to determine the cutoff point of an ultrasound measurement, the cardiofemoral index (CFI), calculated using the biventricular outer dimension (BVOD) and femur length to diagnosis severe anemia. The CFI measurement was performed before each of the 336 cordocenteses on 131 fetuses. Diagnosis test analysis and receiver-operating characteristics (ROC) curves were used and the area under the curve (AUC) was calculated to compare the overall accuracy of the CFI for anemia diagnosis, between
fetuses with or without previous intrauterine transfusions (IUT). Results: At first
cordocentesis (n = 131) the AUC was 0.75 (95% CI, 0.66-0.84). For cases where fetuses
had undergone 1 previous transfusion (n = 88) the AUC was 0.76 (95% CI, 0.64-0.88) and
at the time of the third cordocentesis for IUT (n = 53) it was 0.73 (95% CI, 0.59-0.86). For a
0.59 CFI threshold to diagnosis fetuses with hemoglobin deficit above 5 g/dL, sensitivity
values were 87.2%, 88.0%, and 94.1% respectively for fetuses without IUT, with 1 IUT, and
with 2 IUTs. Likelihood ratios for positive (LR+) and negative (LR-) test results were 1.98,
2.05, 1.69 and 0.23, 0.21, 0.13 respectively. Conclusion: The cardiofemoral index may be
an effective noninvasive marker of severe fetal anemia in high-risk fetuses, with accuracy
similar for fetuses either with or without previous transfusions. 2007 International
Federation of Gynecology and Obstetrics.

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10. A case of monochorionic twin pregnancy complicated with intrauterine
single fetal death with successful treatment of intrauterine blood transfusion in the
surviving fetus

Author(s): Nakata M., Sumie M., Murata S., Miwa I., Kusaka E., Sugino N.

Citation: Fetal Diagnosis and Therapy, December 2007, vol./is. 22/1(7-9), 1015-3837 (Dec
2006)

Publication Date: December 2007

Abstract: We report a case of monochorionic twin pregnancy complicated with single fetal
demise that received successful treatment of intrauterine transfusion for severe anemia of
the surviving fetus. A single fetal demise occurred at 20 weeks of gestation and middle
cerebral artery peak systolic velocity (MCA-PSV), a marker for fetal anemia, showed
marked elevation in the surviving fetus. Fetal blood sampling was immediately done and
severe fetal anemia (hemoglobin = 5.5 g/dl, hematocrit = 16.8%) was confirmed, and then
intrauterine transfusion was performed. After transfusion, MCA-PSV rapidly decreased to
the normal value and remained within normal range until delivery. A healthy 2,640 g male
infant was delivered at 35 weeks of gestation without anemic status and no neurological
problem was found at 1-year old. The present report supports that intrauterine rescue
transfusion is a useful treatment to prevent the adverse outcome of surviving fetus in
monochorionic twin pregnancy complicated with single fetal demise, and monitoring of
MCA-PSV is also useful to assess anemic status of the surviving fetus. Copyright 2007 S.
Karger AG.

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11. Repeated hematocrit measurements in low-risk pregnant women

Author(s): Bailit J.L., Doty E., Todia W.

Citation: Journal of Reproductive Medicine for the Obstetrician and Gynecologist, July
2007, vol./is. 52/7(619-622), 0024-7758 (Jul 2007)

Publication Date: July 2007

Abstract: OBJECTIVE: To determine the incidence of anemia in the third trimester among
women with normal hematocrits early in pregnancy. STUDY DESIGN: Low-risk women
seeking prenatal care were identified. Patients with a hematocrit > 33% in the first or
second trimester and a hematocrit drawn in the third trimester were included. Rates of
anemia; hematocrit < 33%; and severe anemia, hematocrit < 30%; were determined. The
primary outcome was the development of anemia in the third trimester. RESULTS: A total
of 1,604 women met inclusion criteria; 16.2% of women became anemic, and 4.5% became
severely anemic in the third trimester. Using a starting hematocrit value of 39% as a cutoff, only 66% of women would need to be rescreened in the third trimester in order to detect 78.5% of anemias (sensitivity 78.5%, specificity 39.7%, negative predictive value 90.5%).

CONCLUSION: The percent of women with normal hematocrits in the first trimester who become anemic in the third trimester is 16.2. Hematocrit screening in the third trimester may be unnecessary for low-risk women with starting hematocrits > 39%. Journal of Reproductive Medicine, Inc.

Source: EMBASE

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12. The Use of Iron Sucrose Complex for Anemia in Pregnancy and the Postpartum Period

Author(s): Breymann C.

Citation: Seminars in Hematology, October 2006, vol./is. 43/SUPPL. 6(S28-S31), 0037-1963 (Oct 2006)

Publication Date: October 2006

Abstract: Iron-deficiency anemia resulting in reduced blood reserves is one the most common problems in pregnancy. It is estimated that 20% to 50% of the world population is suffering from iron deficiency and iron-deficient states, pregnancy being one of the most important "risk factors" for iron deficiency and iron-deficiency anemia. The traditional treatments, ie, oral iron therapy and blood transfusion, involve significant drawbacks. High doses of oral iron frequently cause side effects, and noncompliance is common. Therefore, intravenous iron, alone or in association with recombinant human erythropoietin (rHuEPO) therapy, has been considered as an alternative in the management of iron deficiency in this setting. There is increasing evidence that iron sucrose is safe for the mother and the fetus using the recommended dosages and therapy regimens. Iron sucrose is effective in pregnant and postpartum patients who do not respond to oral iron, who are noncompliant to oral iron, or who are treated with rHuEPO. In both cases, according to the present data, the expected hemoglobin increase and time for therapy are predictable in responding patients. Whether it is reasonable to wait for a response to oral iron in moderate to severe anemia is therefore questionable. Indications for the use of iron sucrose complex are: preexisting (moderate-severe) anemia; no effect of oral iron; side effects of oral iron; refusal of blood transfusion (eg, Jehovah's Witness patients); limited time until delivery; coexisting risks (eg, bowel disease, renal disease); pre- and postoperative period and postpartum anemia. Future fields of research are the evaluation of patient satisfaction and quality of life, impact on costs and hospital stay, impact on blood transfusion frequency and mortality rate, and finally impact on other factors such as breast feeding behavior and neonatal outcome such as birth weight, prematurity and neonatal iron stores. 2006 Elsevier Inc. All rights reserved.

Source: EMBASE

Full Text:
Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

13. Hemoglobinopathies in pregnancy

Author(s): Hassell K.

Citation: Current Women's Health Reviews, February 2006, vol./is. 2/1(41-49), 1573-4048 (Feb 2006)

Publication Date: February 2006

Abstract: Hemoglobinopathies, including sickle cell disease and thalassemia, present unique health care challenges during pregnancy. Women with sickle cell disease generally tolerate pregnancy well, with low maternal and perinatal mortality, when provided access to coordinated high-risk obstetrical and hematological care. Pregnancy may be complicated by pre-term labor, intrauterine growth retardation, small-for-gestational-age births and
increased sickle cell pain crises and complications. Transfusion support does not improve maternal or fetal complications, even if used to correct severe anemia, but does lessen the incidence of sickle cell events, and should be reserved for women with severe anemia (hemoglobin <6.0 gm/dl), frequent severe pain crisis or other sickle cell complications. Women with sickle cell trait have an increased incidence of bacturia during pregnancy, but do not experience manifestations of sickle cell disease. Other hemoglobinopathies, including hemoglobin EE and hemoglobin CC disease, do not significantly affect pregnancy. Few pregnancies have been reported in women with Cooley's anemia (beta-thalassemia) due to infertility; these women and some with hemoglobin H disease (severe alpha-thalassemia) require transfusion support during pregnancy. The presence of high-affinity hemoglobins has not been associated with adverse pregnancy outcomes. Recognition and accurate diagnosis of a maternal hemoglobinopathy is imperative for appropriate management and genetic counseling. 2006 Bentham Science Publishers Ltd.

Source: EMBASE

14. Severe anemia in malaria: Defense gone wrong?

Author(s): Winter G., Wahlgren M.

Citation: Blood, November 2005, vol./is. 106/10(3337-3338), 0006-4971;0006-4971 (15 Nov 2005)

Publication Date: November 2005

Abstract: In its severe form, malaria encompasses 3 major life-threatening manifestations, cerebral malaria (CM), severe malarial anemia (SMA), and respiratory distress. Layez and colleagues shed light on the mechanisms of the least understood syndrome, malaria-induced anemia.

Source: EMBASE

Full Text:

Available in fulltext at Highwire Press

Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

15. Darbepoetin alfa treatment for post-renal transplantation anemia during pregnancy

Author(s): Goshorn J., Youell T.D.

Citation: American Journal of Kidney Diseases, November 2005, vol./is. 46/5(e81-e86), 0272-6386 (Nov 2005)

Publication Date: November 2005

Abstract: Anemia is common in patients with chronic kidney disease (CKD) and those who have received a kidney allograft. Anemia is most prevalent in kidney transplant recipients before and immediately after transplantation, but also can occur months after transplantation if the donor kidney begins to fail. Replacement therapy for CKD-related and posttransplantation anemia is effective through the administration of exogenous erythropoiesis-stimulating proteins. Darbepoetin alfa (Aranesp; Amgen Inc, Thousand Oaks, CA) is a unique erythropoiesis-stimulating protein that can be administered at an extended dosing interval relative to recombinant human erythropoietin because of its approximately 3-fold longer serum half-life. Although darbepoetin alfa has been shown to be an effective treatment for patients with anemia of CKD and anemia after kidney transplantation, limited data have been published showing efficacy in treating women with anemia of these conditions during pregnancy. We report a case of successful darbepoetin alfa treatment for severe anemia in a pregnant transplant recipient. 2005 by the National Kidney Foundation, Inc.

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16. **Differential transmission of parvovirus B19 in a twin gestation: A case report**

**Author(s):** Foster Sr. R.T., Allen S.R.

**Citation:** Twin Research, October 2004, vol./is. 7/5(412-414), 1369-0523 (Oct 2004)

**Publication Date:** October 2004

**Abstract:** Maternal infection with parvovirus B19 during pregnancy can cause aplastic anemia in the fetus. Severe anemia may lead to nonimmune hydrops or fetal demise. In the case reported, the demise of one twin was diagnosed by ultrasonography in an asymptomatic 21-year-old para 1-0-2-1 African American at the gestational age of 25 weeks. The deceased twin (A) was grossly hydropic with anasarca, ascites, pleural and pericardial effusions, and a thickened placenta. Parvovirus B19 DNA was found in the amniotic fluid of Twin A using the polymerase chain-reaction technique. Serial scans of Twin B showed normal growth and no evidence of hydrops. The pregnancy was managed expectantly until 29 weeks when delivery was indicated by maternal disseminated intravascular coagulation. Maternal IgM antiparvovirus B19 antibodies were detected at the time of delivery. Antiparvovirus B19 IgM antibodies were not present in Twin B. These serologic studies suggest a recent acute maternal infection and refute such an infection in Twin B. We present a case of differential transmission of parvovirus B19 in a twin pregnancy with in utero death of the infected twin and subsequent maternal disseminated intravascular coagulation.

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17. **The value of middle cerebral artery peak systolic velocity in the diagnosis of fetal anemia after intrauterine death of one monochorionic twin**

**Author(s):** Senat M.V., Loizeau S., Couderc S., Bernard J.P., Ville Y.

**Citation:** American Journal of Obstetrics and Gynecology, November 2003, vol./is. 189/5(1320-1324), 0002-9378 (Nov 2003)

**Publication Date:** November 2003

**Abstract:** OBJECTIVE: The purpose of this study was to assess the value of the fetal middle cerebral artery peak systolic velocity in the prediction of anemia within 24 hours of the death of one monochorionic twin in twin-to-twin transfusion syndrome and to establish the correlation between middle cerebral artery peak systolic velocity and hemoglobin concentration in fetuses who are at risk for acute anemia. STUDY DESIGN: Doppler examination of the middle cerebral artery peak systolic velocity was performed in 20 monochorionic survivors of pregnancies that were complicated by twin-to-twin-transfusion syndrome that occurred between 20 and 34 weeks of gestation. Doppler examination was performed before cordocentesis and after intrauterine transfusion when appropriate. Both hemoglobin concentration and middle cerebral artery peak systolic velocity were expressed in multiples of the median. Severe anemia was defined as hemoglobin concentration of < 0.55 multiples of the median, and we used the cutoff point of 1.50 times the median values at any gestational age to calculate the sensitivity and specificity of middle cerebral artery peak systolic velocity in detecting moderate or severe anemia. RESULTS: Fetal anemia was confirmed in 10 of 20 fetuses. We performed seven intrauterine transfusions. The sensitivity and specificity of middle cerebral artery peak systolic velocity in the prediction of severe fetal anemia were of 90%, with a false-negative rate of 10%. The correlation between peak systolic velocity and hemoglobin concentration both before and after transfusion was evaluated by regression analysis and was strongly significant. CONCLUSION: In fetuses who are at risk of acute anemia, the measurement of middle cerebral artery peak systolic velocity was found to be a reliable noninvasive diagnostic tool and may be helpful in counseling and planning invasive assessment.

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18. Conventional management of maternal red cell alloimmunization compared with management by Doppler assessment of middle cerebral artery peak systolic velocity

Author(s): Pereira L., Jenkins T.M., Berghella V.

Citation: American Journal of Obstetrics and Gynecology, October 2003, vol./is. 189/4(1002-1006), 0002-9378 (Oct 2003)

Publication Date: October 2003

Abstract: OBJECTIVE: This study was undertaken to compare management of red blood cell alloimmunization by Doppler measurement of middle cerebral artery peak systolic velocity (MCA-PSV) to conventional management with amniocentesis. STUDY DESIGN: A historical cohort of 28 fetuses at risk for anemia caused by red blood cell alloimmunization was followed between 1999 and 2002 at a single institution. The decision to perform percutaneous umbilical cord blood sampling (PUBS) was based on conventional management. MCA-PSV Doppler was measured before amniocentesis or PUBS but not used clinically. RESULTS: Twenty-eight fetuses were followed up: 4 had severe anemia, 1 had moderate anemia, 3 had mild anemia, and 20 were nonanemic. Conventional management had a sensitivity and positive predictive value for moderate-to-severe anemia of 80% and 44%, with a false-positive rate of 56%. In the same patients, MCA-PSV Doppler had a sensitivity and positive predictive value for moderate-to-severe anemia of 100% and 71%, with a false-positive rate of 28%. CONCLUSION: Compared with conventional management, MCA-PSV Doppler may have a better predictive accuracy for moderate-to-severe fetal anemia in red blood cell alloimmunization. Management by MCA-PSV Doppler may eliminate the need for amniocentesis and reduce the number of PUBS performed in red blood cell-alloimmunized pregnancies.

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19. Malaria as a cause of severe anaemia in pregnancy [10]

Author(s): Shulman C.E., Dorman E.K., Bulmer J.N.

Citation: Lancet, August 2002, vol./is. 360/9331(494), 0140-6736 (10 Aug 2002)

Publication Date: August 2002

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Available in print at Lincoln County Hospital Professional Library

20. Pure red cell aplasia and acute hepatitis during pregnancy

Author(s): Ohno Y., Itakura A., Sano M., Mizutani S.

Citation: Gynecologic and Obstetric Investigation, 2002, vol./is. 53/2(112-113), 0378-7346 (2002)
Publication Date: 2002

Abstract: Pure red cell aplasia during pregnancy is rare. We present a case in a 26-year-old pregnant woman, referred to our hospital at 31 weeks' gestation because of severe anemia caused by acute hepatitis. She was treated with repeated blood transfusions and the pure red cell aplasia gradually remitted during the pregnancy. A live infant was delivered by cesarean section at 34 weeks' gestation. Postpartum, the pure red cell aplasia and hemolytic anemia remitted completely. Our case illustrates that pure red cell aplasia may occur late in pregnancy associated with acute viral hepatitis and is reversible during pregnancy without any necessity for steroid therapy. Copyright 2002 S. Karger AG, Basel.

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21. Doppler ultrasound velocimetry for timing the second intrauterine transfusion in fetuses with anemia from red cell alloimmunization

Author(s): Detti L., Oz U., Guney I., Ferguson J.E., Bahado-Singh R.O., Mari G.

Citation: American Journal of Obstetrics and Gynecology, 2001, vol./is. 185/5(1048-1051), 0002-9378 (2001)

Publication Date: 2001

Abstract: OBJECTIVE: Middle cerebral artery peak systolic velocity has been successfully used for timing the first cordocentesis in fetuses who are at risk for anemia because of maternal red cell alloimmunization. The effects on Doppler velocimetry after the intrauterine transfusion of adult blood to these fetuses are unknown. The objective of this study was to assess the applicability of Doppler methods for the prediction of severe anemia in fetuses who had undergone 1 previous intrauterine transfusion. STUDY DESIGN: Doppler examination of middle cerebral artery peak systolic velocity was performed before cordocentesis in 84 fetuses who had undergone 1 previous intrauterine transfusion. Timing of the second intrauterine transfusion was based on traditional criteria. Anemia was defined as mild (hemoglobin value between 0.84 and 0.85 multiples of the median), moderate (hemoglobin value <0.65-0.55 multiples of the median), and severe (hemoglobin value <0.55 multiples of the median). Receiver operator characteristic curves were created to select threshold values to identify the 3 degrees of anemia with a sensitivity of 100%. RESULTS: Gestational age at the Doppler study ranged from 19 to 36 weeks. Forty-six fetuses (72%) were not or mildly anemic; 7 fetuses (11%) were moderately anemic, and 11 fetuses (17%) were severely anemic. Middle cerebral artery peak systolic velocity for the prediction of severe, moderate, and mild anemia at a sensitivity of 100% showed false-positive rates of 6%, 37%, and 70%, respectively. CONCLUSION: In fetuses who have undergone 1 previous intrauterine transfusion because of maternal red cell alloimmunization, timing the second intrauterine transfusion can be determined noninvasively by Doppler ultrasonography on the basis of an increase in the peak velocity of systolic blood flow in the middle cerebral artery.

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22. Maternal hemoglobin concentration and birth weight

Author(s): Steer P.J.

Citation: American Journal of Clinical Nutrition, May 2000, vol./is. 71/5 SUPPL.(1285S-1287S), 0002-9165 (May 2000)

Publication Date: May 2000

Abstract: Pregnancy requires additional maternal absorption of iron. Maternal iron status cannot be assessed simply from hemoglobin concentration because pregnancy produces increases in plasma volume and the hemoglobin concentration decreases accordingly. This
decrease is greatest in women with large babies or multiple gestations. However, mean corpuscular volume does not change substantially during pregnancy and a hemoglobin concentration <95 g/L in association with a mean corpuscular volume <84 fL probably indicates iron deficiency. Severe anemia (hemoglobin <80 g/L) is associated with the birth of small babies (from both preterm labor and growth restriction), but so is failure of the plasma volume to expand. Hemoglobin concentrations > 120 g/L at the end of the second trimester are associated with a <=3-fold increased risk of preeclampsia and intrauterine growth restriction. The minimum incidence of low birth weight (<2.5 kg) and of preterm labor (<37 completed weeks) occurs in association with a hemoglobin concentration of 95-105 g/L. This is widely regarded as indicating anemia in the pregnant woman but, if associated with a mean corpuscular volume >84 fL, should be considered optimal.

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23. High and low hemoglobin levels during pregnancy: Differential risks for preterm birth and small for gestational age

Author(s): Scanlon K.S., Yip R., Schieve L.A., Cogswell M.E.

Citation: Obstetrics and Gynecology, 2000, vol./is. 96/5(741-748), 0029-7844 (2000)

Publication Date: 2000

Abstract: Objective: To examine the association of maternal hemoglobin during pregnancy with preterm birth and small for gestational age (SGA). Methods: We performed a retrospective cohort analysis of hemoglobin and birth outcome among 173,031 pregnant women who attended publicly funded health programs in ten states and delivered a liveborn infant at 26-42 weeks' gestation. We defined preterm as less than 37 weeks' gestation and SGA as less than the tenth percentile of a US fetal growth reference. Results: Risk of preterm birth was increased in women with low hemoglobin level in the first and second trimester. The odds ratio (OR) for preterm birth with moderate-to-severe anemia during the first trimester (more than three standard deviations [SD] below reference median hemoglobin, equivalent to less than 95 g/L at 12 weeks' gestation) was 1.68 (95% confidence interval [CI] 1.29, 2.21). Anemia was not associated with SGA. High hemoglobin level during the first and second trimester was associated with SGA but not preterm birth. The ORs for SGA in women with very high hemoglobin level during the first and second trimester (more than three SDs above reference median hemoglobin, equivalent to greater than 149 g/L at 12 weeks' gestation and greater than 144 g/L at 18 weeks') were 1.27 (95% CI 1.02, 1.58) and 1.79 (95% CI 1.49, 2.15), respectively. Conclusion: These data highlight the importance of considering anemia and high hemoglobin level as indicators for adverse pregnancy outcome. An elevated hemoglobin level (greater than 144 g/L) is an indicator for possible pregnancy complications associated with poor plasma volume expansion, and should not be mistaken for good iron status. (C) 2000 by the American College of Obstetricians and Gynecologists.

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24. Anemia in pregnancy

Author(s): Sifakis S., Pharmacides G.

Citation: Annals of the New York Academy of Sciences, 2000, vol./is. 900/(125-136), 0077-8923 (2000)

Publication Date: 2000
Abstract: Anemia is one of the most frequent complications related to pregnancy. Normal physiologic changes in pregnancy affect the hemoglobin (Hb), and there is a relative or absolute reduction in Hb concentration. The most common true anemias during pregnancy are iron deficiency anemia (approximately 75%) and folate deficiency megaloblastic anemia, which are more common in women who have inadequate diets and who are not receiving prenatal iron and folate supplements. Severe anemia may have adverse effects on the mother and the fetus. Anemia with hemoglobin levels less than 6 gr/dl is associated with poor pregnancy outcome. Prematurity, spontaneous abortions, low birth weight, and fetal deaths are complications of severe maternal anemia. Nevertheless, a mild to moderate iron deficiency does not appear to cause a significant effect on fetal hemoglobin concentration. An Hb level of 11 gr/dl in the late first trimester and also of 10 gr/dl in the second and third trimesters are suggested as lower limits for Hb concentration. In an iron-deficient state, iron supplementation must be given and follow-up is indicated to diagnose iron-unresponsive anemias.

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25. Fetal transfusion for red blood cell alloimmunization in pregnancy

Author(s): Schumacher B., Moise Jr. K.J.

Citation: Obstetrics and Gynecology, July 1996, vol./is. 88/1(137-150), 0029-7844 (Jul 1996)

Publication Date: July 1996

Abstract: Objective: To present an up-to-date review of the literature encompassing all important aspects of fetal transfusion for red blood cell alloimmunization in pregnancy. Data Sources: A MEDLINE computer data base search was conducted for pertinent articles through August 1995. Additional publications were identified by cross-referencing. Methods of Study Selection: All pertinent references were reviewed by the authors, and their clinical significance in the fetal treatment of red blood cell alloimmunization was summarized. Tabulation, Integration, and Results: Fetal intraperitoneal transfusion in the treatment of severe red blood cell alloimmunization was first reported by Liley in 1963. Since then, major advancements have included intravascular techniques and fetal paralysis. A total of seven different approaches have been used. Case series describing fetal intravascular transfusion were reviewed, and outcomes were analyzed for all pregnancies and, separately, for those presenting with and without hydrops fetalis. Eighty-four percent of 411 fetuses that underwent intravascular transfusion had good outcomes. Ninety-four percent of nonhydroptic fetuses and 74% of hydropic fetuses survived. Those with severe anemia but no hydrops at transfusion were five times more likely to survive than fetuses already hydropic. Conclusion: For pregnant patients presenting with severe red blood cell alloimmunization remote from term, fetal transfusion remains the best available therapeutic option. It is a safe procedure with a perinatal loss rate of approximately 1-3%, and overall neonatal survival exceeds 80%. It is the best available option until red blood cell alloimmunization can be prevented altogether.

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26. Fetal iron status in maternal anemia

Author(s): Singla P.N., Tyagi M., Shankar R., Dash D., Kumar A.


Publication Date: 1996
Abstract: Hemoglobin, serum iron, transferrin saturation and ferritin were measured on paired maternal and cord blood samples in 54 anemic (hemoglobin < 110 g/L) and 22 non-anemic (hemoglobin <= 110 g/L) pregnant women at term gestation. The levels of hemoglobin, serum iron, transferrin saturation and ferritin were significantly low in the cord blood of anemic women, suggesting that iron supply to the fetus was reduced in maternal anemia. The linear relationships of these parameters with both maternal hemoglobin and maternal serum ferritin indicated that the fetus extracted iron in amounts proportional to the levels available in the mother. Infants of mothers with moderate and severe anemia had significantly lower cord serum ferritin levels and hence poor iron stores at birth. It is concluded that iron deficiency anemia during pregnancy adversely affects the iron endowment of the infant at birth.

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27. Meta-analysis of efficacy and tolerability data on iron protein succinylate in patients with iron deficiency anemia of different severity

Author(s): Kopcke W., Sauerland M.C.

Citation: Arzneimittel-Forschung/Drug Research, 1995, vol./is. 45/11(1211-1216), 0004-4172 (1995)

Publication Date: 1995

Abstract: Iron protein succinylate (ITF 282, CAS 93615-44-2) is an iron derivative for the oral treatment of iron deficiency anemia. Its efficacy and tolerability have been proved in about 1800 patients, enrolled in 3 multicenter clinical trials. The first aim of this meta-analysis is to verify the increase of hemoglobin (Hb) in these patients (891 treated with ITF 282, 644 treated with iron sulphate and 236 treated with iron-polyestere sulphonate). The 3 studies show homogeneous Hb increases. ITF 282 appeared to provide, from time 0 to the 30th day of treatment, a similar or lesser increase in Hb in comparison to the reference drugs, while from the 30th day to the 60th day its efficacy was always greater than that of the reference medications. The data have been further analyzed by subdividing the patients in three classes, according to the severity of the anemia: basal Hb <= 9 g/dl, > 9 <= 11 g/dl, > 11 g/dl. During the 60-day treatment, both ITF 282 and the reference drugs induced the most significant increase in Hb in the patients affected by the most severe anemia. The meta-analytic evaluation of the 3 trials results has been extended to tolerability data. Most side effects were related to the gastrointestinal tract. Their incidence resulted significantly lower for ITF 282 than that for the reference drugs (9.4% vs. 20.4%, p < 0.01). The comparative sub-analysis of the side effect distribution into the patients population shows that ITF 282 is definitely better tolerated in pregnant women (relative risk 0.321, p < 0.01). The time course of Hb increases and the tolerability data suggest a different mechanism by which ITF 282 and the reference drugs are effective. Since the main difference between ITP 282 and the reference drugs is the form in which the iron is presented to the gastrointestinal mucosa, it may be supposed that the reference drugs, providing free divalent iron ions for absorption, could induce some kind of irritative condition of the gastrointestinal mucosa, which results in a reduced long-term absorption capacity, as well as in a higher incidence of gastroenteric adverse events. ITF282, providing protein-bound iron, would not permit the process supposed with divalent iron, thus resulting in prolonged absorption capacity (that is higher hemoglobin recovery) and higher gastrointestinal tolerability.

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28. Successful use of recombinant human erythropoietin in a pregnant woman with lupus nephritis

Author(s): Kontessis P.S., Paraskevopoulos A., Papageorgiou I., Rappini P., Digenis G.E.
Antsaklis A., Zerefos N.

**Citation:** American Journal of Kidney Diseases, 1995, vol./is. 26/5(781-784), 0272-6386 (1995)

**Publication Date:** 1995

**Abstract:** Recombinant human erythropoietin (r-HuEPO) is broadly accepted as treatment for anemia in dialysis and nondialysis patients with chronic renal failure, but data regarding the safety and efficacy of this drug in pregnancy are limited. Maternal and fetal problems have been reported to be associated with anemia during pregnancy. On the other hand, anemia is a frequent feature of systemic lupus erythematosus. We report the successful use of r-HuEPO in a young woman with lupus nephritis complicated by severe anemia during pregnancy. Additional studies should be encouraged to confirm the safety of r-HuEPO therapy during pregnancy.

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29. **Severe anemia of pregnancy, recent experience**

**Author(s):** Sarin A.R.

**Citation:** International Journal of Gynecology and Obstetrics, 1995, vol./is. 50/SUPPL. 2(S45-S49), 0020-7292 (1995)

**Publication Date:** 1995

**Abstract:** We undertook this study to determine the current prevalence of anemia in pregnancy and its impact on maternal and perinatal mortality and morbidity, and to suggest ways to make the anemia prevention programs more effective. The incidence of pregnancy anemia was determined by a population-based survey of rural and urban areas using a cluster sample design. Mortality and morbidity data were gathered from our own hospital records. The survey data showed that 86.1% of pregnant women (n = 4752) were anemic (Hb < 11 g/dl); 56.0% had severe anemia (Hb < 7 g/dl); and 1.9% were decompensated (Hb < 4 g/dl). The hospital-based analysis revealed that severe anemia contributed to 34.5% of all maternal deaths (case fatality ratio = 1769). Hypertensive disorders were found in 28.2% of severe anemia cases. The incidence of preterm labor was 31.2% in these cases and the birthweight 2.23 +/- 1.13 kg (mean +/- SD), while perinatal mortality was 65 compared to overall rates of 7.9%, 2.78 +/- 1.32 kg and 46, respectively. We conclude that severe anemia of pregnancy is still rampant and its adverse consequences remain unabated. The risk-care approach is advocated as an alternative strategy.

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30. **Erythropoietin use in pregnancy: Two cases and a review of the literature**

**Author(s):** Scott L.L., Ramin S.M., Richey M., Hanson J., Gilstrap III L.C.

**Citation:** American Journal of Perinatology, 1995, vol./is. 12/1(22-24), 0735-1631 (1995)

**Publication Date:** 1995

**Abstract:** End-stage renal disease complicates only a small percentage of pregnancies, but, of these, virtually all become anemic due to a deficiency in erythropoietin. Erythropoietin has been shown to correct anemia due to renal disease in nonpregnant patients. We report two cases of erythropoietin use during pregnancy complicated by severe anemia due to renal failure. No maternal or fetal side effects were noted. Our two cases exemplify that erythropoietin is an effective means of treating anemia due to renal disease in the gravid patient.

**Source:** EMBASE
31. Fetal venous, arterial, and intracardiac blood flows in red blood-cell isoimmunization

Author(s): Hecher K., Snijders R., Campbell S., Nicolaides K.

Citation: Obstetrics and Gynecology, 1995, vol./is. 85/1(122-128), 0029-7844 (1995)

Publication Date: 1995

Abstract: Objective: To investigate the effect of anemia on fetal venous, arterial, and intracardiac blood flows. Methods: Color flow Doppler was used to record flow-velocity waveforms from the atrioventricular valves, ductus venosus, right hepatic vein, inferior vena cava, middle cerebral artery, and descending thoracic aorta from 38 cases of red blood cell isoimmunized pregnancies. Immediately after the Doppler studies, funipuncture was performed and the fetal hemoglobin concentration was measured. Results: Blood now velocities in the thoracic aorta, middle cerebral artery, and the ductus venosus were increased compared to reference ranges established previously; however, a significant association with the degree of anemia was found only for the velocity in the thoracic aorta. Pulsatility indices in arteries and veins and the ratio of early to late atrioventricular inflow velocities were not significantly different from normal. Conclusions: Fetal anemia is associated with a hyperdynamic circulation in both arterial and venous vessels. Even in severe anemia, there is no evidence of congestive heart failure. Venous and intracardiac Doppler studies do not provide a clinically useful contribution in the management of red blood cell isoimmunization.

Source: EMBASE

32. Perinatal outcome of one fetal death in twin-twin transfusion syndrome


Citation: Journal of Medical Ultrasound, 1994, vol./is. 2/3(142-146), 0929-6441 (1994)

Publication Date: 1994

Abstract: Background: This study was conducted to evaluate the perinatal outcome of the surviving fetus after one fetal death in twin-twin transfusion syndrome (TTTS) and the possible mechanism determining the outcome. Methods: A cooperative study was conducted at three hospitals in Taiwan from October 1, 1991 to January 30, 1993. The clinical course, and perinatal and placental findings in five sets of twin pregnancies complicated by TTTS with one fetal death were studied. Results: Subsequent intrauterine death or immediate neonatal death of the surviving fetus due to severe anemia was noted in the three severe or moderate cases. In the two mild cases, both infants were born alive with a macerated co-twin, but with organ damage and disseminated intravascular coagulation. Severe anemia was also noted in one of the mild cases. Conclusion: The outcome of the surviving fetus complicated by TTTS with one fetal demise is quite poor. Both acute blood shunting and disseminated intravascular coagulation contribute to the poor prognosis. In moderate or severe twin-twin transfusion syndrome, the death of one fetus results in a large amount of blood shunting from the survivor to the dead fetus, the surviving fetus dying subsequently due to rapid blood loss. In mild cases, the acute blood shunting is less and the fetuses may survive with anemia of varying degrees of severity. However, anemia as well as subsequent disseminated intravascular coagulation may cause severe handicap and even neonatal death of the surviving infant.

Source: EMBASE
33. Pregnancy and paroxysmal nocturnal hemoglobinuria

Author(s): Bais J., Pel M., Von Dem Borne A., Van Der Lelie H.

Citation: European Journal of Obstetrics Gynecology and Reproductive Biology, 1994, vol./is. 53/3(211-214), 0028-2243 (1994)

Publication Date: 1994

Abstract: A patient is described who developed symptoms of paroxysmal nocturnal hemoglobinuria (PNH) in her first pregnancy. This was uneventful except for a spontaneous preterm delivery. The second pregnancy was complicated by severe anemia and a hemolytic crisis with Budd-Chiari syndrome at 31 weeks' amenorrhoea. Delivery was again preterm and was the result of induced labour after premature rupture of membranes at 34 weeks. Literature shows a high maternal mortality among PNH patients (5.8%). The most common cause of death is liver vein thrombosis (Budd-Chiari syndrome). Fetal wastage (30%) and prematurity rate (16%) are also high. Recommendations for follow-up and therapy are given such as anticoagulation therapy, platelets and washed erythrocytes transfusions, screening for Budd-Chiari syndrome and infections.

Source: EMBASE

34. Gestational trophoblastic disease among adolescents

Author(s): Bayatpour M., Reyes J.

Citation: Adolescent and Pediatric Gynecology, 1993, vol./is. 6/4(220-222), 0932-8610 (1993)

Publication Date: 1993

Abstract: Gestational trophoblastic disease encompasses hydatidiform mole (HM) or molar pregnancy (MP), choriocarcinoma, and placental site tumor. Retrospective review of 11 adolescents with HM is presented with emphasis on the differences found between this population and adult women with similar conditions. We have found HM to be a relatively common complication of pregnancy among adolescents when compared with adult women. The pattern of clinical presentation in adolescents is notable for its heavy vaginal bleeding which leads to severe anemia in a high percentage of cases (27%), and often requires transfusions. Interestingly, preeclampsia, which is common (12-27%) among other age groups, was not found in our group of patients.

Source: EMBASE

35. Trisomy 21, fetal hydrops, and anemia: Prenatal diagnosis of transient myeloproliferative disorder?

Author(s): Hendricks S.K., Sorensen T.K., Baker E.R.

Citation: Obstetrics and Gynecology, 1993, vol./is. 82/4 II SUPPL.(703-705), 0029-7844 (1993)

Publication Date: 1993

Abstract: Background: Aneuploidy is frequently cited as an etiology of hydrops fetalis. Traditionally, associated anomalies (specifically cardiovascular abnormalities) have been postulated as the causative factor. Cases: We report two cases of severe anemia associated with hydrops in fetuses that later proved to have Down syndrome. The hematocrit in both fetuses was markedly decreased. The white blood cell count was normal in one but greatly elevated in the other; the latter infant had thrombocytopenia. These findings are consistent with transient myeloproliferative disorder. Conclusions: Nonimmune fetal hydrops and trisomy 21 may be associated without cardiac or anatomical anomalies.
Transient myeloproliferative disorder has been seen in neonates with trisomy 21 and may be a cause of hydrops in some aneuploid fetuses. Chromosomal analysis should not be excluded in the workup of nonimmune hydrops when anemia is found, and therapy may be withheld until karyotyping has been performed.

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36. Fetal plasma erythropoietin concentration in red blood cell-isoimmunized pregnancies

Author(s): Thilaganathan B., Salvesen D.R., Abbas A., Ireland R.M., Nicolaides K.H.

Citation: American Journal of Obstetrics and Gynecology, 1992, vol./is. 167/5(1292-1297), 0002-9378 (1992)

Publication Date: 1992

Abstract: Objective: The aim of this study was to investigate the relationship between fetal anemia, plasma erythropoietin concentration, and erythroblastosis in red blood cell-isoimmunized pregnancies. Study design: Fetal plasma erythropoietin concentration in umbilical venous blood samples from 68 red blood cell-isoimmunized pregnancies at 18 to 35 weeks' gestation was measured. Measurements were compared with the appropriate reference range with gestation, and associations with blood pH, erythroblast count, and hemoglobin concentration were examined. Results: The mean fetal plasma erythropoietin concentration and erythroblast count in red blood cell-isoimmunized pregnancies were significantly increased only in severe fetal anemia (hemoglobin deficit >7 gm/dl). Furthermore, some severely anemic fetuses were hydropic and acidemic. The degree of increase in plasma erythropoietin was significantly associated with both fetal acidemia and, more strongly, fetal erythroblastosis. Conclusion: These findings suggest that in fetuses from red blood cell-isoimmunized pregnancies the ability to prevent tissue hypoxia is present until anemia becomes severe, presumably by an increase in cardiac output and tissue perfusion. In severe anemia tissue hypoxia occurs, and the data indicate that fetuses respond by increasing erythropoietin production from at least 20 weeks' gestation. Furthermore, more accurate assessment of tissue oxygenation may be obtained by measuring the erythroblast count rather than the blood pH.

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37. Erythropoietin in pregnancies complicated by severe anemia of renal failure

Author(s): Yankowitz J., Piraino B., Laifer S.A., Frassetto L., Gavin L., Kitzmiller J.L., Crombleholme W.

Citation: Obstetrics and Gynecology, 1992, vol./is. 80/3 II(485-488), 0029-7844 (1992)

Publication Date: 1992

Abstract: Background: Recombinant human erythropoietin has been approved for treatment of the anemia of renal failure since 1989, yet data regarding the safety and efficacy of this drug in pregnancy are limited. We used recombinant human erythropoietin to treat the anemia of renal disease in three pregnant women. Cases: Nadir hematocrit values before initiation of erythropoietin were 19-23%. Erythropoietin, 50-160 U/kg/week subcutaneously, was begun at 14-26 weeks' gestation. Initially, the rise in hematocrit averaged 0.6-2% each week, with peak values of 26.7-32%. Iron supplementation was given simultaneously. Maternal and neonatal outcomes were favorable despite the development of preeclampsia or worsening renal function requiring early delivery. Conclusion: In this small series, erythropoietin begun during the second trimester in a dose of about 100 U/kg/week, in conjunction with orally administered iron, appeared to be effective in treating the anemia of renal failure during pregnancy. Additional experience is
needed to evaluate the safety of this medication during pregnancy.

**Source:** EMBASE

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38. Management of fetal hemolytic disease by cordocentesis. II. Outcome of treatment


**Citation:** American Journal of Obstetrics and Gynecology, 1991, vol./is. 165/5 I(1302-1307), 0002-9378 (1991)

**Publication Date:** 1991

**Abstract:** Forty-eight of 128 pregnancies complicated by maternal red blood cell alloimmunization (49%) received a total of 142 intravascular transfusions (range, 1 to 7) for treatment of severe anemia (hematocrit, <=30%). Thirteen fetuses (27%) had hydrops when therapy was initiated. The overall survival rate was 96%. Eighty-five percent of survivors received two or more transfusions before delivery. The mean gestational age at initiation of therapy was 28 weeks (range, 18 to 36 weeks). Bleeding from uterine and umbilical cord puncture sites was not of clinical significance. The most common complication was fetal bradycardia (8%). Simple intravascular transfusion resulted in the replacement of fetal red blood cells with adult red blood cells and suppression of fetal erythropoiesis. By the completion of the second transfusion, on average, <1% of circulating red blood cells were fetal. Within 3 weeks of the second transfusion, the mean reticulocyte count was <1%. The rate at which the fetal hematocrit declined after a transfusion (exclusive of the first) was inversely related to gestational age (r = -0.84, p < 0.0001), permitting a 4- to 5-week interval between transfusions after 32 weeks' gestation. A total of 78% of surviving neonates were delivered at term. Neonates transfused more than once antenatally required less phototherapy (75.8 +/- 54 vs 165 +/- 101 hours, p < 0.003) and, when delivered at term, fewer hospital days (4.8 +/- 2 vs 8.6 +/- 6 days, p = 0.01) compared with those transfused once. We conclude that the treatment of fetal anemia by intrauterine simple intravascular transfusion permits a term delivery in the majority of cases and is associated with high perinatal survival and low perinatal morbidity.

**Source:** EMBASE

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**Author(s):** Weiner C.P., Williamson R.A., Wenstrom K.D., Sipes S.L., Grant S.S., Widness J.A.

**Citation:** American Journal of Obstetrics and Gynecology, 1991, vol./is. 165/3(546-553), 0002-9378 (1991)

**Publication Date:** 1991

**Abstract:** Between January 1985 and November 1990, 128 pregnancies complicated by maternal red blood cell alloimmunization were referred to our Fetal Diagnosis and Treatment Unit. We examined the premise that an evaluation of fetal blood would accurately identify fetuses at risk of requiring antenatal transfusion therapy. Two hundred seventy-two diagnostic cordocenteses were performed. Criteria for the timing of repeat cordocenteses were developed retrospectively on the basis of the fetal hematocrit values, reticulocyte counts, and direct Coombs' test results of the first 84 pregnancies. These criteria were tested and confirmed prospectively on the next 44 pregnancies. On the basis of the first blood sample, four hematologic patterns (and their distributions) were identified in the 98 antigen-positive fetuses. Pattern 1: fetuses at low risk of having significant
antenatal anemia (hematocrit <30%) (n = 11, 11%). These fetuses had normal hematocrit values and reticulocyte counts coupled with negative or trace-positive direct Coombs' test. No fetus in this group had significant antenatal anemia. Pattern 2: fetuses at intermediate risk of having anemia (n = 29, 31%). Pattern 2 fetuses had normal hematocrit values and either direct Coombs' titers of more than trace <=2+ and normal reticulocyte counts or low reticulocyte counts (<2.5th percentile for gestation). Twenty-one percent (n = 6) of fetuses in pattern 2 had significant antenatal anemia. Patterns 3 and 4: fetuses at greatest risk of having severe anemia. These fetuses had normal hematocrit values associated with either reticulocyte counts >97.5th percentile for gestation or a direct Coombs' test >=3+ (pattern 3, n = 49,50%) or both, or a mild anemia (>30% but <2.5th percentile for gestation) (pattern 4, n = 9, 10%). Eighty percent (n = 39) of fetuses with pattern 3 and 90% (n = 8) with pattern 4 developed a hematocrit value <30%. We conclude that evaluation of fetal hemolytic disease with a fetal blood specimen permits the identification of fetuses at high risk of having antenatal anemia.

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40. The influence of anemia on respiratory gases and acid base parameters of the fetus

Author(s): Lazarevic B., Ljubic A., Stevic R., Sulovic V., Rosic B., Radunovic N., Ilic S.
Citation: Clinical and Experimental Obstetrics and Gynecology, 1991, vol./is. 18/2(85-89), 0390-6663 (1991)
Publication Date: 1991
Abstract: Fetal blood samples were collected by cordocentesis from 82 pregnant women; 12 of whom had severe forms of Rh isoimmunization, while 70 comprised the control group. The mean hematocrit value in the group under investigation was 15.72 +/- 3.62% and indication of severe anemia. The pH value in this group was 7.31 +/- 0.06; pCO2 partial pressure 6.36 +/- 0.64; O2 -2.65 +/- 0.89 kPa; bicarbonate 23.84 +/- 3.02 mMol/l; base excess was -2.72 +/- 2.66 mMol/l and saturation 28.66 +/- 15.56%. In the control group the following values were established: pH -7.386 +/- 0.05; partial pressure pCO2 -4.980 +/- 0.31 kPa; O2 -4.960 +/- 0.90 kPa; bicarbonate 21.560 +/- 0.27 mMol/l; base excess -2.30 +/- 0.90 mMol/l and saturation 67.23 +/- 11.60%. The pH, partial pressure O2 and saturation values were significantly lower, while partial pressure CO2 was significantly higher in the investigated group than in the control group. Bicarbonates and base excess do not change significantly in the presence of anemia. Fetal blood sampling carried out by means of cordocentesis is the most reliable method for assessment of the degree of fetal anemia. The values of acid base parameters and of blood gases are an indication of either respiratory, respiratory-metabolic or metabolic acidosis. The possibilities of prenatal diagnostics, undoubtedly, contribute to a significant reduction of perinatal mortality.

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41. Hematologic manifestations in pediatric HIV infection: Severe anemia as a prognostic factor

Author(s): Ellaurie M., Burns E.R., Rubinstein A.
Citation: American Journal of Pediatric Hematology/Oncology, 1990, vol./is. 12/4(449-453), 0192-8562 (1990)
Publication Date: 1990
Abstract: The hematologic profile of 100 symptomatic children infected by the human immunodeficiency virus (HIV) was evaluated and compared to HIV uninfected infants with transplacentally acquired maternal anti-HIV antibodies, and to HIV-negative infants born to
i.v. drug-abusing HIV uninfected mothers. Anemia was present in 94% of HIV-infected infants and was a major predictor of disease progression. In 91% of patients having a hematocrit (HcT) <25%, the disease course was rapidly fatal. Leukopenia and thrombocytopenia occurred in 47 and 33% of HIV infected patients, respectively. Neutropenia was most severe in children with opportunistic infections. There was no evidence of suppression of any component of hematopoiesis by passively acquired antibodies to HIV.

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42. Cordocentesis for the diagnosis and treatment of human fetal parvovirus infection

Author(s): Peters M.T., Nicolaides K.H.
Citation: Obstetrics and Gynecology, 1990, vol./is. 75/3 II(501-504), 0029-7844 (1990)
Publication Date: 1990
Abstract: Human parvovirus B-19 infection was diagnosed by DNA hybridization in blood obtained by cordocentesis from two hydropic fetuses at 22 and 26 weeks' gestation; B-19-specific immunoglobulin M (IgM) in fetal blood was negative in both cases. Hematologic studies demonstrated severe anemia, which was treated by intravascular fetal blood transfusions. The hydrops resolved and healthy infants were delivered at term. The pathophysiology of hydrops in fetal parvovirus infection is discussed.

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43. Chronic, massive fetomaternal hemorrhage treated with repeated fetal intravascular transfusions

Author(s): Fischer R.L., Kuhlman K., Grover J., Montgomery O., Wapner R.J.
Citation: American Journal of Obstetrics and Gynecology, 1990, vol./is. 162/1(203-204), 0002-9378 (1990)
Publication Date: 1990
Abstract: We report the first known case of chronic, massive fetomaternal hemorrhage managed by serial fetal intravascular transfusions. Timing of transfusions was guided by fetal heart rate patterns and fetal movement evaluation. Despite severe anemia and a sinusoidal heart rate pattern, the fetus demonstrated normal blood gases and no sign of hydrops.

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44. Two hundred intrauterine exchange transfusions in severe blood incompatibilities

Author(s): Poissonnier M.-H., Brossard Y., Demedeiros N., Vassileva J., Parnet F., Larsden M., Gosset M., Chavinie J., Huchet J.
Citation: American Journal of Obstetrics and Gynecology, 1989, vol./is. 161/3(709-713), 0002-9378 (1989)
Publication Date: 1989
Abstract: Two hundred intrauterine exchange transfusions were performed under local anesthesia in 107 cases of blood incompatibilities (60 fetuses with severe anemia and 47 with hydrops). Under sonographic guidance, depending on fetal and placental position, an optimal puncturing site was selected along the umbilical vein: placental insertion, fetal insertion, or fetal intraabdominal segment. Tests were immediately performed to confirm fetal origin of blood obtained and estimate hemoglobin level. Blood used for exchange transfusion was compatible with maternal blood and had a hematocrit value of 75%. Exchange transfusion was continued until a hemoglobin level of 16 gm/dl was reached. This procedure was first associated with intraperitoneal transfusions and was subsequently used independently once a month to maintain an adequate hemoglobin level. In 4 fetuses with hydrops, antenatal regression of this sign was observed in 33 cases (70.2%). Overall outcome of 107 fetuses after exchanges was 84 living neonates (78.5%), 15 deaths in utero, and eight neonatal deaths. The survival rate was 91.6% for fetuses without hydrops and 61.7% for those with hydrops. The advantage of exchange transfusion appears to be rapid and efficient correction of anemia with elimination of incompatible fetal red blood cells.

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45. Severe fetomaternal hemorrhage. A report of four cases

Author(s): Moya F.R., Perez A., Reece E.A.
Citation: The Journal of reproductive medicine, March 1987, vol./is. 32/3(243-246), 0024-7758 (Mar 1987)
Publication Date: March 1987
Abstract: Four cases of severe fetomaternal hemorrhage (FMH) presented with severe anemia and signs of circulatory failure. One of the patients developed the syndrome of persistent fetal circulation. The diagnosis of FMH was confirmed in all using Kleihauer-Betke tests, which demonstrated abundant fetal erythrocytes in the maternal circulation. Three infants survived after prompt volume replacement and correction of anemia. The only fatality was related to an underlying chromosomal disorder. The majority of reported neonatal deaths due to FMH have occurred when shock was the presenting manifestation.

Source: EMBASE

46. Hemoglobin E and pregnancy

Author(s): Ferguson II J.E., O'Reilly R.A.
Citation: Obstetrics and Gynecology, 1985, vol./is. 66/1(136-140), 0029-7844 (1985)
Publication Date: 1985
Abstract: Hemoglobin E occurs in 30 million people, primarily Southeast Asians. Their resettlement within the US has dramatically increased the incidence of E hemoglobinopathies. A gravid Vietnamese woman with thalassemia major is reported herein. Her pregnancy was complicated by severe anemia, intrauterine growth retardation, and a paraspinal mass representing extramedullary hematopoiesis. The diagnosis of hemoglobin E/beta-thalassemia was established when analysis of her hemoglobin showed 60% F, 40% E, and 0% A. The patient was transfused with packed red blood cells to maintain the maternal hematocrit at 30%. A term growth-retarded infant was delivered who had severe thrombocytopenia and an imperforate anus. The infant's thrombocytopenia responded only to infusion of maternal platelets. The differential diagnosis and expected hematologic manifestations of the various E hemoglobinopathies are detailed. Hematologic and obstetric guidelines for management during pregnancy are offered.

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47. Folic acid and vitamin B₁₂ deficiency in pregnancy and in the neonatal period

Author(s): Majid Shojania A.

Citation: Clinics in Perinatology, 1984, vol./is. 11/2(433-459), 0095-5108 (1984)

Publication Date: 1984

Abstract: Folate deficiency is a common occurrence during pregnancy in those who are not taking folic acid prophylactically. This deficiency in an advanced stage can cause severe megaloblastic anemia and all of the complications of severe anemia of pregnancy. Many other complications such as the increased incidence of abruptio placentae, toxemia of pregnancy, abortion, stillbirth, prematurity, congenital malformations, and, especially neural tube defects, have been attributed to folate deficiency in pregnancy. Although the relation of these complications to folate deficiency is still controversial, the high incidence of folate deficiency in pregnancy and possible complications attributed to it justify the prophylactic use of folic acid in any pregnant women whose adequate dietary folate intake cannot be ensured. Vitamin B₁₂ deficiency in pregnancy is not common and, if it exists, it is always due to an underlying disorder such as pernicious anemia, B₁₂ malabsorption, or vegetarianism. In the absence of these conditions, vitamin B₁₂ deficiency would not occur in pregnancy, and any megaloblastic anemia of pregnancy should be considered to be due to folate deficiency even if the serum B₁₂ is low. At birth, newborns have higher serum and red cell folate than do adults: their folate store is proportional to their gestational age and their folate requirement is proportional to their rate of growth. These factors make the small premature, who is born with lower folate stores and a relatively higher folate requirement, prone to develop folate deficiency, and many prematurely born infants show laboratory evidence of folate deficiency by 1 1/2 to 3 months of age. An argument has been made in favor of the prophylactic use of folic acid in the first three months of life for infants with a birth weight below 1700 gm. In contrast to folate deficiency, vitamin B₁₂ deficiency in early infancy is very rare. There are only two groups who are likely to develop B₁₂ deficiency megaloblastic anemia in early infancy. The first group includes the infants who have hereditary transcobalamic II deficiency (very rare). The second group is made up of infants who are breast-fed by mothers with vitamin B₁₂ deficiency.

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48. Severe neonatal anemia possibly caused by spontaneous cephalic version, with excellent outcome - A case report

Author(s): Franckx J., Sacre-Smith L.

Citation: Journal of Perinatal Medicine, 1984, vol./is. 12/3(147-150), 0300-5577 (1984)

Publication Date: 1984

Abstract: A 29-year-old primipara with breech presentation had a spontaneous cephalic version of few days before her admission. She was hospitalised because of a sudden decrease in fetal movements. During labour a sinusoidal fetal heart rate pattern was observed. The mother gave birth to a strikingly pale 3250 g boy. His APGAR score was 1/5/6. Cord hemoglobin was 2.9 g/dl and an acid elution test showed the presence of 9.1% fetal red cells in the maternal circulation. Following a transfusion of packed cells and total blood, the baby's hemoglobin rose to above 10 g/dl. On the second day of life he developed an acute functional renal failure which responded well to fluid restriction and furosemide administration. Upon discharge, 10 days after birth, the physical and neurological examination were normal. At present, the child is two years old and thriving. Anemia in the newborn due to occult blood loss may be the result of bleeding of the fetus into the maternal circulation. The incidence of a massive transplacental blood loss is increased by traumatic amniocentesis, by external cephalic version and during cesarian section. As illustrated by the present case, spontaneous cephalic version may also account for feto-maternal transfusion in severe neonatal anemia. Severe anemia at birth secondary to an acute and massive feto-maternal hemorrhage is commonly associated with a poor
59. An unusual complication of fetal blood sampling during labor

Author(s): Modanlou H.D., Linzey E.M.
Citation: Obstetrics and gynecology, January 1978, vol./is. 51/1 Suppl(7s-8s), 0029-7844 (Jan 1978)
Publication Date: January 1978
Abstract: A female infant was delivered at term after biophysical and biochemical monitoring during the intrapartum period. At birth excessive bleeding was noted from the scalp incision sites, leading to severe anemia. The infant was also found to have congenital syphilis. The clinical course was complicated by the development of disseminated intravascular coagulation leading to death despite intensive management. Identification and appropriate management of excessive pre- and postnatal bleeding from a sampling incision is emphasized.
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Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

50. Ethacrynic acid and packed-blood-cell transfusion in treatment of severe anaemia in pregnancy

Author(s): Harrison K.A., Ajabor L.N., Lawson J.B.
Citation: Lancet, January 1971, vol./is. 1/7688(11-14), 0140-6736 (2 Jan 1971)
Publication Date: January 1971
Abstract: Ethacrynic acid was used in combination with packed-blood-cell transfusion in the treatment of severe anaemia in pregnancy. The plasma volume and urine flow were monitored to assess the efficacy of the treatment.
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51. Changes in blood volume produced by treatment of severe anaemia in pregnancy

Author(s): Harrison K.A.
Citation: Clinical science, April 1969, vol./is. 36/2(197-207), 0009-9287 (Apr 1969)
Publication Date: April 1969
Abstract: Changes in blood volume were measured during the treatment of severe anaemia in pregnancy. The results were used to assess the efficacy of the treatment.
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Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

52. Ethacrynic acid in blood transfusion—its effects on plasma volume and urine flow in severe anaemia in pregnancy

Author(s): Harrison K.A.
Citation: British medical journal, October 1968, vol./is. 4/5623(84-86), 0007-1447 (12 Oct 1968)
53. Blood volume in pregnant women with severe anaemia
Author(s): Vyas R.B., Patel V.R., Patel V.G., Bhaty R.M.
Citation: The Journal of obstetrics and gynaecology of the British Commonwealth, July 1968, vol./is. 75/7(713-717), 0022-3204 (Jul 1968)
Publication Date: July 1968
Source: EMBASE
Full Text: Available in fulltext at National Library of Medicine

54. The haematocrit ratio in severe anaemia in pregnancy
Author(s): Harrison K.A.
Citation: The Journal of obstetrics and gynaecology of the British Commonwealth, February 1968, vol./is. 75/2(128-132), 0022-3204 (Feb 1968)
Publication Date: February 1968
Source: EMBASE
Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

55. Blood-volume changes in severe anaemia in pregnancy
Author(s): Harrison K.A.
Citation: Lancet, January 1967, vol./is. 1/7480(20-25), 0140-6736 (7 Jan 1967)
Publication Date: January 1967
Source: EMBASE
Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

56. Total dose intravenous infusion of iron-dextran (imferon) in severe anemia
Author(s): Bhatt R.V., Joshi S.K., Shah M.C.
Citation: American journal of obstetrics and gynecology, April 1966, vol./is. 94/8(1098-1102), 0002-9378 (15 Apr 1966)
Publication Date: April 1966
Source: EMBASE
Full Text: Available in print at a non-ULHT hospital library. Click and complete an online form to request this article/an article from this journal.

57. Severe anemia with hemolysis and megaloblastic erythropoiesis. A reaction to nitrofurantoin administered during pregnancy
Author(s): Pritchard J.A., Scott D.E., Mason R.A.
Myelodysplasia diagnosed during pregnancy with temporary haematological improvement after delivery

Author(s): Gidiri M., Masson E.A., Ali S., Freites J., Carter C., Lindow S.W.

Citation: Journal of Obstetrics and Gynaecology, 2009, vol./is. 29/7(665-667), 0144-3615;1364-6893 (2009)

Publication Date: 2009

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preterm delivery was approximately doubled in pregnant women with moderate-to-severe anemia during the ...

Treatment of severe aplastic anemia with a combination of horse antithymocyte globulin and cyclosporine, with or without sirolimus: a prospective randomized study
P Scheinberg, CO Wu, O Nunez… - ..., 2009 - haematologica.org
... Retreatment with rabbit anti-thymocyte globulin and ciclosporin for patients with relapsed or refractory severe aplastic anaemia. ... Marked improvement in short- and long-term survival in severe aplastic anemia patients treated with immunosuppression in the past 18 years ...

Treatment with intravenous immunoglobulin and steroids may correct severe anemia in hyperhemolytic transfusion reactions: Case report and literature review
N Win, S Sinha, E Lee… - Transfusion Medicine Reviews, 2010 - Elsevier
... 3 The pregnant patient (case 2) who developed acute HHTR at 26 weeks gestation received IVIG/steroids and transfusion. ... Severe anemia/Mota et al 8, (a) First episode (DHTR)/6 d, Anti-c, ... Refractory anemia/Muro et al 9, (a) First episode DHTR, No RBC antibody, ...

Emergency transfusion for acute severe anemia: a calculated risk
RB Weiskopf - Anesthesia & Analgesia, 2010 - IARS
... Pao 2 in healthy humans decreases the heart rate response to acute severe anemia 12 (also ... have no clinical measures that let us know of impending insufficient oxygenation as anemia progresses ... Effect of anaemia and cardiovascular disease on surgical mortality and morbidity ...

Hematological responses to intramuscular versus oral iron in treatment of Anemia with pregnancy
NMAA Mahmoud - 2011 - med.shams.edu.eg
... NS, Malhotra M. Effect of dietary habits on prevalence of anemia in pregnant women of ... Ferrum Hausmann) and oral ferrous fumarate in the treatment of iron deficiency anemia in pregnancy. ... World Health Organisation (WHO) (1993) Prevention and treatment of severe anaemia. ...

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