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West Middlesex University Hospital

## Kyphoscoliosis in Pregnancy

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### 1. Revision surgery after pregnancy in a patient with congenital kyphoscoliosis: A case report.

**Author(s):** Li, Zhikun; Wang, Fei; Xu, Wei; Li, Yifan; Zhu, Xiaodong

**Source:** Medicine; Dec 2016; vol. 95 (no. 49); p. e5624

**Publication Date:** Dec 2016

**Publication Type(s):** Journal Article

Available in full text at [Medicine](#). - from Ovid

**Abstract:** Rod breakage during pregnancy and delivery has never been described in a patient who has undergone surgery for congenital scoliosis (CS). Here, we present an unusual but significant case of revision surgery. A 29-year-old woman presented with low back pain during pregnancy after posterior osteotomy, correction and fusion at T9 to L5 for CS. Radiographs during follow-up, 4 months after the patient gave birth, demonstrated rod breakage. Rod breakage after orthopaedic surgery of congenital kyphoscoliosis INTERVENTIONS:: The patient was taken into the operating room for replacement of the broken rods, recovery of sagittal balance, bone graft fusion, and improvement of stability by cross-connection. The patient recovered fully by the 3-month postoperative follow-up. In follow-up, the instruments were in good condition, the orthopedic effect was not lost, and low back pain relief was observed. We opine that the rod breakage during pregnancy resulted from weight gain and a lack of an anterior approach to the supportive bone graft. Therefore, female patients with spinal surgery should visit the hospital for advice before pregnancy.

**Database:** Medline

### 2. Anesthetic management of parturient with thoracic kyphoscoliosis, malaria and acute respiratory distress syndrome for urgent cesarean section.

**Author(s):** Pandey, Ravindra Kr; Batra, Meenu M; Darlong, Vanlal; Garg, Rakesh; Punj, Jyotsna; Kumar, Sri

**Source:** Journal of anaesthesiology, clinical pharmacology; 2015; vol. 31 (no. 4); p. 558-559

**Publication Date:** 2015

**Publication Type(s):** Journal Article

Available in full text at [Journal of Anaesthesiology, Clinical Pharmacology](#) - from National Library of Medicine

**Abstract:** The management of cesarean section in kyphoscoliotic patient is challenging. The respiratory changes and increased metabolic demands due to pregnancy may compromise the limited respiratory reserves in such patients. Presence of other comorbidities like malaria and respiratory tract infection will further compromise the effective oxygenation. We report a case of kyphoscoliosis along with malaria and acute respiratory distress syndrome for urgent cesarean section.

**Database:** Medline

### **3. Post Pregnancy Severe Spinal Osteoporosis with Multiple Vertebral Fractures and Kyphoscoliosis in a Multigravida: A Rare Case with Management.**

**Author(s):** Hadgaonkar, Shailesh; Shah, Kunal Chandrakant; Bhatt, Hrutvij; Shyam, Ashok; Sancheti, Parag

**Source:** Asian spine journal; Aug 2015; vol. 9 (no. 4); p. 625-628

**Publication Date:** Aug 2015

**Publication Type(s):** Journal Article

Available in full text at [Asian Spine Journal](#) - from National Library of Medicine

**Abstract:** Osteoporosis associated with pregnancy and lactation is a less commonly known condition and often overlooked. The prevalence, exact aetiology and its pathogenesis are unknown. It is commonly seen in first three months after delivery in primigravida. It is often undiagnosed because of it not suspected and X-rays and densitometry are avoided if possible during pregnancy and lactation. If missed, it can lead to osteoporotic fractures and disability. In this paper, we report a case of a 24-year-old multigravida 4 months after pregnancy with multiple vertebral compression fractures and kyphoscoliosis. Her metabolic workup was normal but bone densitometry revealed severe osteoporosis of the dorso-lumbar spine. Immediate weaning and antiresorptives like bisphosphonates and teriparatide are used as first line drugs to manage postpartum spinal osteoporosis. Our patient presented at 4 month lactation and did not want to wean her infant, so she was treated with total contact orthosis and took vitamin D and calcium. The pain was relieved within 3 months but there was no improvement in bone density. After eight months when the infant was weaned, she was treated with teriparatide. After one year of teriparatide therapy, there were no new fractures and densitometry scores improved.

**Database:** Medline

### **4. Achondroplasia: Anaesthetic challenges for caesarean section**

**Author(s):** Dubiel L.; Scott G.A.; Agaram R.; McGrady E.; Litchfield K.N.; Duncan A.

**Source:** International Journal of Obstetric Anesthesia; 2014; vol. 23 (no. 3); p. 274-278

**Publication Date:** 2014

**Publication Type(s):** Journal: Article

**Abstract:** Pregnancy in women with achondroplasia presents major challenges for anaesthetists and obstetricians. We report the case of a woman with achondroplasia who underwent general anaesthesia for an elective caesarean section. She was 99 cm in height and her condition was further complicated by severe kyphoscoliosis and previous back surgery. She was reviewed in the first trimester at the anaesthetic high-risk clinic. A multidisciplinary team was convened to plan her peripartum care. Because of increasing dyspnoea caesarean section was performed at 32 weeks of gestation. She received a general anaesthetic using a modified rapid-sequence technique with remifentanyl and rocuronium. The intraoperative period was complicated by desaturation and high airway pressures. The woman's postoperative care was complicated by respiratory compromise requiring high dependency care. © 2014 The Authors. Published by Elsevier Ltd.

**Database:** EMBASE

## **5. Musculoskeletal symptoms and orthopaedic complications in pregnancy: Pathophysiology, diagnostic approaches and modern management**

**Author(s):** Bhardwaj A.; Nagandla K.

**Source:** Postgraduate Medical Journal; Aug 2014; vol. 90 (no. 1066); p. 450-460

**Publication Date:** Aug 2014

**Publication Type(s):** Journal: Review

Available in full text at [Postgraduate medical journal](#) - from Highwire Press

**Abstract:** Low back pain is a common musculoskeletal symptom in pregnancy that can present as lumbar pain or pelvic girdle pain, with significant physical and psychosocial implications. Pelvic girdle pain is more prevalent and results in greater disability than lumbar pain. It is possible to distinguish between these two conditions from a detailed history based on the site of the pain, its intensity, disability and pain provocation tests. Management of low back pain in pregnancy is conservative, with physical exercise for lumbar pain and minimising activities that exacerbate pain, analgesics and bed rest for pelvic girdle pain, as well as avoiding abduction beyond the pain-free zone in labour. There is evidence that stabilising exercises in patients with pelvic girdle pain postpartum have a beneficial effect. Other treatment modalities that have been shown to be safe and effective include pelvic belts, transcutaneous electrical nerve stimulation, spinal manipulative therapy, acupuncture and complementary therapy with yoga. Other orthopaedic complications in pregnancy such as carpal tunnel syndrome, pubic symphysis rupture, transient osteoporosis and osteonecrosis are usually self-limiting with a satisfactory outcome. However, a lack of awareness and failure to recognise these complications can result in long-term morbidity. Knowledge of the preoperative diagnostic investigations, surgical approaches and intraoperative positioning of the mother to avoid gravid uterus compression is vital in orthopaedic emergencies such as lumbar disc herniation, cauda equina syndrome, fractures and acute compartment syndrome of the lower limb to ensure a safe maternal and fetal outcome and to prevent serious disability. Pregnancy is not contraindicated in women with preexisting orthopaedic complications such as kyphoscoliosis and total hip arthroplasty as there is no evidence to suggest increased maternal or fetal risks. severe debilitating pain. The pain can adversely affect the quality of life, affect sick leave and predispose to chronic pain syndrome.<sup>2</sup> There is evidence that an increasing number of women are requesting elective delivery by induction or caesarean section to achieve symptomatic relief. Such complications and delivery options increase the risk to the mother and the fetus, with significant resource implications.<sup>3 4</sup> In addition, lifethreatening complications in pregnancy such as venous thromboembolism are reported to be related to ambulatory difficulties during acute episodes of pain.<sup>5</sup> There is, however, insufficient knowledge about the management strategies due to fear of possible harm to the fetus resulting from the effects of treatment. <sup>4</sup> This paper reviews the terminology, epidemiology, pathophysiology, diagnostic approaches and evidence-based modern management of the common musculoskeletal symptoms, orthopaedic complications and pregnancy outcomes in the presence of pre-existing orthopaedic conditions in pregnancy.

**Database:** EMBASE

## **6. Successful pregnancy in ventilatory failure due to campomelic dysplasia with severe kyphoscoliosis**

**Author(s):** Khor Y.H.; Rautela L.; Chao C.; Howard M.; Walker S.; Robinson A.

**Source:** Internal Medicine Journal; Jul 2014; vol. 44 (no. 7); p. 712-713

**Publication Date:** Jul 2014

**Publication Type(s):** Journal: Letter

Available in full text at [Internal Medicine Journal](#) - from John Wiley and Sons

**Database:** EMBASE

## **7. Continuous spinal anaesthesia and analgesia for emergency caesarean section in a patient with severe kyphoscoliosis and acute lower respiratory tract infection**

**Author(s):** Rupasingha K.; Pallemulle R.E.

**Source:** Sri Lankan Journal of Anaesthesiology; 2013; vol. 21 (no. 2); p. 79-82

**Publication Date:** 2013

**Publication Type(s):** Journal: Article

**Abstract:**A primigravida with severe kyphoscoliosis and acute lower respiratory tract infection underwent emergency caesarean section (CS) under continuous spinal anaesthesia without complications in a major maternity hospital. This report highlights the anaesthetic challenges and the importance of early involvement of the anaesthesiologist.

**Database:** EMBASE

## **8. Anesthetic management of a parturient with VACTERL association undergoing Cesarean delivery.**

**Author(s):** Hilton, Gillian; Mihm, Frederick; Butwick, Alexander

**Source:** Canadian journal of anaesthesia = Journal canadien d'anesthesie; Jun 2013; vol. 60 (no. 6); p. 570-576

**Publication Date:** Jun 2013

**Publication Type(s):** Case Reports Journal Article

Available in full text at [Canadian Journal of Anesthesia](#) - from ProQuest

**Abstract:**We present the anesthetic management of a parturient with VACTERL association undergoing combined regional and general anesthesia for Cesarean delivery. Defined as a syndrome, VACTERL association comprises at least three of the following abnormalities: vertebral, anal atresia, cardiac, tracheoesophageal, renal, and limb. The patient's anatomic abnormalities and comorbidities comprised severe cervicothoracic scoliosis, kyphoscoliosis, congenitally fused ribs, and severe restrictive lung disease. She had a Mallampati class 3 airway, a right laterally flexed neck, and reduced mandibular protrusion. We performed a lumbar spine ultrasound for epidural placement which was used to provide peri- and postoperative analgesia. Due to the anticipated difficult tracheal intubation, the patient underwent an awake fiberoptic intubation and subsequently received general anesthesia. The patient's trachea was extubated on the first postoperative day, and she received adequate post-Cesarean epidural analgesia. This case highlights the challenges that anesthesiologists face when managing parturients at extremely high risk for perioperative anesthetic morbidity due to the presence of severe pre-existing disease, anticipated difficult airway, and major

spinal abnormalities complicating neuraxial anesthesia. We used a combined general and epidural anesthetic approach to control ventilation, provide effective postoperative analgesia, and reduce the risk of anesthetic-related perioperative morbidity. An individualized approach should be considered for the anesthetic management of high-risk pregnant patients with complex and multiple medical and surgical morbidities undergoing labour and delivery.

**Database:** Medline

### **9. An anaesthetic challenge: Caesarean section for a patient with a facial arterio-venous malformation and polio**

**Author(s):** Bell S.F.; De Lloyd L.; Stacey M.; Collis R.

**Source:** International Journal of Obstetric Anesthesia; May 2013; vol. 22

**Publication Date:** May 2013

**Publication Type(s):** Journal: Conference Abstract

**Abstract:** Introduction: We present a patient with the challenging combination of an expanding facial arterio-venous malformation (AVM) and history of polio causing significant kyphoscoliosis and lower limb paralysis. Case report: A 30-year-old Portuguese speaking nulliparous African woman presented to our institution antenatally with two significant co-morbidities. Firstly, a congenital facial AVM which expanded dramatically during pregnancy to protruberantly overlie the left frontal bone, nose, orbit and maxilla. Secondly, the patient had suffered from polio, causing bilateral lower limb paralysis and severe kyphoscoliosis. The patient was admitted at 29 weeks of gestation due to expansion and bleeding of the AVM (prompting concerns regarding sudden haemorrhage), anaemia, requiring transfusion, and increasing dyspnoea and tachycardia. She also developed hypertension requiring amlodipine. After multidisciplinary discussion, caesarean section was planned at 34 weeks because of maternal deterioration. Relative merits of neuraxial versus general anaesthesia were considered. Potential airway issues included difficulty with face mask fit (pre-oxygenation, bag- mask ventilation) and bleeding in the airway from the AVM due to trauma or hypertension at induction or extubation. Neuraxial anaesthesia presented significant technical challenges, unpredictable block spread, likely poor tolerance of high blockade, and possible emergency conversion to general anaesthesia. We proceeded with combined spinal-epidural (CSE) with invasive arterial monitoring. The CSE was inserted uneventfully and achieved an excellent block. However the patient was extremely anxious. Light sedation via propofol infusion provided anxiolysis and surgery was commenced uneventfully with an estimated blood loss of 700 mL. Five days post delivery she had an unprovoked bleed from the AVM requiring emergency intubation and embolisation. She has made a good recovery and is now home with her healthy baby. Discussion: This case illustrates the challenges of rare conditions affecting both the airway and back. AVMs are prone to expansion during pregnancy although the course of this is unpredictable. Cautious surveillance is mandatory. Severe kyphoscoliosis poses undoubted technical challenges to the anaesthetist and may cause unpredictable distribution of local anaesthetic within the intrathecal space; but if there has been no surgical intervention then epidural blockade is likely to be reliable. CSE can be used as an effective technique for providing anaesthesia for caesarean section. The importance of multidisciplinary planning and preparation for these high-risk cases cannot be overemphasised.

**Database:** EMBASE

## **10. Myelomeningocele and pregnancy: A case report and review of the literature**

**Author(s):** Blasi I.; Comitini G.; Abrate M.; La Sala G.B.; Ferrari A.; Vinci V.

**Source:** Journal of Maternal-Fetal and Neonatal Medicine; Jul 2012; vol. 25 (no. 7); p. 1176-1178

**Publication Date:** Jul 2012

**Publication Type(s):** Journal: Review

Available in full text at [Journal of Maternal-Fetal and Neonatal Medicine, The](#) - from Taylor & Francis

**Abstract:**The improvement of antenatal management and surgical techniques has greatly increased the survival rate of infants with spina bifida. More of these women are reaching adulthood and reproductive age and therefore could become pregnant. Pregnancy complications depend on the kind of spina bifida and subject's condition. We report a case of woman with a severe kyphoscoliosis, that progressively affects lung capacity until 32 weeks of gestation, when she underwent caesarean section. These patients deserve careful obstetric care, genetic counselling and urological, obstetric, neurological and anaesthetic management. © 2012 Informa UK, Ltd.

**Database:** EMBASE

## **11. Parturient with kyphoscoliosis (operated) for cesarean section.**

**Author(s):** Veliath, David G; Sharma, Raji; Ranjan, Rv; Kumar, Cp Rajesh; Ramachandran, Tr

**Source:** Journal of anaesthesiology, clinical pharmacology; Jan 2012; vol. 28 (no. 1); p. 124-126

**Publication Date:** Jan 2012

**Publication Type(s):** Journal Article

Available in full text at [Journal of Anaesthesiology, Clinical Pharmacology](#) - from National Library of Medicine

**Abstract:**Anesthesia for emergency cesarean section for the pregnant patient with surgically corrected scoliosis is associated with potential risks for both mother and the fetus due to alterations in maternal physiology and the pathological changes seen in scoliosis. The anesthetic management must address the well being of both mother and fetus. The need for anesthesia for obstetric delivery in pregnant women with scoliosis is much more than in the normal parturient. We report the successful use of spinal anesthesia in a patient with surgically corrected scoliosis for emergency cesarean section.

**Database:** Medline

## **12. Anaesthetic management of a parturient with noonan syndrome**

**Author(s):** Almeida A.; Cunha A.; Bernardino A.; Paiva T.; Medeiros N.

**Source:** Regional Anesthesia and Pain Medicine; 2011; vol. 36 (no. 5)

**Publication Date:** 2011

**Publication Type(s):** Journal: Conference Abstract

Available in full text at [Regional Anesthesia and Pain Medicine](#) - from Ovid

**Abstract:**Background and Goal of Study: The Noonan syndrome(NS) is a genetic disease characterized by short stature, hypertelorism, anterior projection of the ears, short neck, pectus excavatum and underdeveloped genitals. Valve abnormalities and coagulation disorders are commonly associated. Methods: 28 years-old parturient with NS, proposed for cesarean at 36 weeks of gestation for oligohydramnios and delayed intrauterine growth. The patient had restrictive respiratory pattern, kyphoscoliosis and pectus excavatum. She had short stature(130 cm), retrognathia, lower jaw forming triangular, Mallampati III, poor mouth opening(G 1cm), poor neck mobility. Had undergone three general anesthetic procedures: aortic valve stenosis repair (5months-old) and 2 corrective surgeries of kyphoscoliosis (12 and 18 years) with impossible intubation in one of them and consequent tracheotomy. We tried neuroaxial blockade technique with no success after several attempts. After explanation of the technique, the parturient was sedated with midazolam , and fiberoptic intubation with 7 endotracheal tube was performed. Immediately after intubation, induction was performed with propofol and remifentanyl, maintaining spontaneous ventilation. The surgical procedure lasted for 17 minutes. The patient remained stable and was discharged uneventfully postoperatively. Results: This parturient was an anesthetic challenge due to her respiratory changes and anticipated difficult intubation. We couldn't perform a central block probably because of altered conformation of the spine and her surgical history. Although the predicted difficult airway and the respiratory disease, we performed a general anesthesia with fiberoptic intubation without incidents or complications. Conclusion: The Noonan's syndrome is an anesthetic challenge due to expected difficult intubation, respiratory, cardiovascular and coagulation disorders, and skeletal deformations.

**Database:** EMBASE

### **13. Kyphoscoliosis complicating pregnancy: maternal and neonatal outcome.**

**Author(s):** Chopra, Seema; Adhikari, Kaliprasad; Agarwal, Neelam; Suri, Vanita; Sikka, Pooja

**Source:** Archives of gynecology and obstetrics; Aug 2011; vol. 284 (no. 2); p. 295-297

**Publication Date:** Aug 2011

**Publication Type(s):** Journal Article

Available in full text at [Archives of Gynecology and Obstetrics](#) - from Springer Link Journals

**Abstract:**To assess the outcome of pregnancies complicated by kyphoscoliosis in modern obstetric and orthopedic care. A total of 22 kyphoscoliotic patients with 34 pregnancies were identified from 46,828 pregnancies between 1998 and 2009. Their obstetric records and associated orthopedic problem were studied. The incidence of kyphoscoliosis complicating pregnancy was 0.072%. The mean age of the patients in their index pregnancy was 28.4 years (range 23-35), mean height 130 cm (range 125-138). The cause of kyphoscoliosis included idiopathic (majority), poliomyelitis and traumatic injury. Only 1 of the patient had previous spinal surgery. The cesarean rate was very high and none had any significant cardiorespiratory problem during anesthesia. There was no maternal or perinatal mortality. The high maternal and perinatal risks associated with kyphoscoliosis reported earlier no longer exist.

**Database:** Medline

### **14. Loeys Dietz Syndrome: General vs regional anaesthesia for caesarean delivery**

**Author(s):** Hooker N.; Bell R.

**Source:** International Journal of Obstetric Anesthesia; May 2011; vol. 20

**Publication Date:** May 2011

**Publication Type(s):** Journal: Conference Abstract

**Abstract:** Introduction: Loeys Dietz Syndrome (LDS) is a recently described connective tissue disorder associated with a high incidence of vascular dissection and uterine rupture in pregnancy. 1 Anaesthetic management must therefore ensure haemodynamic stability but may be complicated by skeletal and other abnormalities. We report a patient with LDS who underwent two caesarean sections, one under general and one under neuraxial anaesthesia. Case Report: The woman initially presented to the high-risk antenatal clinic with a connective tissue disorder of unspecified diagnosis. She had multiple skeletal abnormalities including kyphoscoliosis, dural ectasia, a high arched palate and micrognathia. Cervical spinal fusion had been performed 6 years earlier for craniocervical instability. She also had asthma and gave a history of easy bruising. Monthly echocardiograms during pregnancy showed stable aortic dimensions; however, she was booked for caesarean section (CS) at 34 weeks to reduce the risk of aortic dissection. In view of her spinal abnormalities, potential bleeding tendency and anticipated difficult intubation general anaesthesia with awake fibreoptic intubation was planned. On the day of surgery this was converted to asleep fibreoptic intubation due to extreme patient anxiety. This proved to be difficult complicated by difficult ventilation. She remained haemodynamically stable but experienced a brief episode of oxygen desaturation to 88%. Blood pressure was controlled with remifentanyl, glyceryl trinitrate and clonidine. Postoperative recovery was uneventful. By her second pregnancy a diagnosis of LDS had been established; in view of the previous difficulties regional anaesthesia for CS was reconsidered. Haematology testing revealed no haemostatic deficit. Lumbar MRI confirmed dural ectasia but with an intact posterior epidural space. A CSE was attempted but no CSF obtained from the spinal needle. A single shot spinal anaesthetic was successful and 2.3 ml plain bupivacaine 0.5% with 25 ng fentanyl achieved a T4 block to cold. Discussion: LDS shares features of Marfan and vascular Ehlers- Danlos (EDS) syndromes. 1 Anaesthetic management for CS has not previously been reported in the literature. Facial malformations can make airway management challenging. Contrary to EDS, LDS does not cause postoperative bleeding<sup>1</sup> and neuraxial anaesthesia may not be contraindicated. Dural ectasia has been implicated in failed spinal blocks<sup>2</sup> although there have been several reports of successful spinal anaesthesia in Marfan patients, in whom dural ectasia is very common. We tried to avoid pooling of drug in the dural ectatic sac by using plain instead of hyperbaric bupivacaine. Detailed imaging of the patient spine is helpful in planning the anaesthetic.

**Database:** EMBASE



### **15. Management of multiple caesarean sections in a parturient with Conradi Huner mann syndrome**

**Author(s):** Syed N.; Kuchi S.; Stone J.; Francis S.; Mushambi M.

**Source:** International Journal of Obstetric Anesthesia; May 2009; vol. 18

**Publication Date:** May 2009

**Publication Type(s):** Journal: Conference Abstract

**Abstract:**Conradi Hunerman Syndrome is a rare genetic disorder associated with abnormal accumulation of calcium within cartilages, epiphysis and other tissues. It can present with short stature, scoliosis, tracheal stenosis, cataracts and/or midfacial hypoplasia. Case report: first pregnancy. A 20 -year-old woman (G8,P0) diagnosed with Conradi Huner mann syndrome, presented to the labour ward with abdominal pain. She was 32 weeks pregnant and had failed to attend several anaesthetic assessment clinic appointments. On examination she was 1.29 m tall, had severe kyphoscoliosis and a scar extending from upper thorax to L1 from previous spinal operations. She had a Mallampatti class III airway, a thyromental distance of <6.0 cm and very restricted neck movement. Previous MRI scans revealed Chiari malformation with cerebellar tonsillar herniation through the foramen magnum extending to the body of C2, and an upper cervical syrinx. After discussion with obstetric colleagues, it was decided that an elective caesarean section was the safest choice. Risks associated with general and regional anaesthesia with a plan for elective and emergency surgery were discussed with the patient. The patient refused to undergo awake fiberoptic intubation and opted for regional anaesthesia despite potential risks for increased herniation of cerebellum.. At 36 weeks elective caesarean section was performed using a continuous spinal catheter technique. A total of 1.2 mL of 0.5% heavy bupivacaine and fentanyl 25 mug of was used. Second pregnancy: 9 months later at 32 weeks of gestation, she presented to the emergency department with selective serotonin reuptake inhibitor and NSAID overdose. Due to unavailability of neonatal cots locally, she was transferred to the nearest unit with a neonatal cot. Anaesthetic risks and management plan were discussed with the receiving hospital team. On arrival at the hospital, decelerations were noted on the CTG and an uneventful caesarean section was performed using the same intrathecal drugs stated above but as a single-shot spinal injection. Discussion:. This case presents successful management of a pregnant woman with Conradi Hunnermann Syndrome who had a difficult airway, a potentially difficult regional block from previous kyphoscoliosis surgery and a risk of worsening cerebellar tonsillar herniation compounded by poor patient compliance.

**Database:** EMBASE

### **16. A maternal and perinatal mortality in pregnancy complicated by the kyphoscoliotic form of Ehlers-danlos syndrome**

**Author(s):** Esaka E.J.; Golde S.H.; Stever M.R.; Thomas R.L.

**Source:** Obstetrics and Gynecology; Feb 2009; vol. 113 (no. 2); p. 515-518

**Publication Date:** Feb 2009

**Publication Type(s):** Journal: Article

Available in full text at [Obstetrics and Gynecology](#) - from Ovid

**Abstract:**Background: Ehlers-Danlos syndrome is a group of inherited connective tissue diseases demonstrating autosomal-dominant, autosomal-recessive, and X-linked inheritance patterns. The diagnosis can be established by clinical, biochemical, and genetic findings. Case: Our nulliparous patient presented with an unspecified diagnosis of Ehlers-Danlos syndrome. Laboratory testing confirmed the kyphoscoliotic type. Based on clinical and phenotypic similarities with the vascular type of Ehlers-Danlos syndrome, termination was advised. Minor trauma in the third trimester led to delivery of a stillborn fetus, which was followed by disseminated intravascular coagulopathy and

death of the mother. Maternal autopsy revealed that there had been a spontaneous rupture of the right iliac artery. Conclusion: Practitioners should be aggressive in recommending effective birth control in patients with the kyphoscoliotic form of Ehlers-Danlos syndrome. In cases of established pregnancy, patients should be made fully aware of their risks of death and severe complications. © 2009 by The American College of Obstetricians and Gynecologists.

**Database:** EMBASE

### **17. Anaesthetic management of a parturient with severe kyphoscoliosis.**

**Author(s):** Bansal, N; Gupta, S

**Source:** Kathmandu University medical journal (KUMJ); 2008; vol. 6 (no. 23); p. 379-382

**Publication Date:** 2008

**Publication Type(s):** Case Reports Journal Article

**Abstract:**Use of neuraxial block in a patient with severe kyphoscoliosis is controversial. We describe the anaesthetic management by spinal anaesthesia of a parturient with severe kyphoscoliosis in obstructed labour. The perioperative course was uneventful. We suggest that a patient with severe kyphoscoliosis may be successfully managed by spinal anaesthesia for caesarean section.

**Database:** Medline

### **18. Cesarean delivery under ultrasound-guided spinal anesthesia [corrected] in a parturient with poliomyelitis and Harrington instrumentation.**

**Author(s):** Costello, Joseph F; Balki, Mrinalini

**Source:** Canadian journal of anaesthesia = Journal canadien d'anesthesie; Sep 2008; vol. 55 (no. 9); p. 606-611

**Publication Date:** Sep 2008

**Publication Type(s):** Case Reports Journal Article

Available in full text at [Canadian Journal of Anesthesia](#) - from ProQuest

**Abstract:**To describe the anesthetic implications, and management of a medically complex parturient, who presented for Cesarean delivery (CD). The patient had poliomyelitis complicated with severe kyphoscoliosis, which had been treated with extensive spinal surgery. We used ultrasound guidance to facilitate successful spinal analgesia and anesthesia. A 27-yr-old woman, with a history of poliomyelitis and moderate restrictive lung disease secondary to kyphoscoliosis, presented at 38 weeks gestation for elective CD because of cephalopelvic disproportion. The woman had Harrington rods in situ from the level of the second thoracic vertebra, to the level of the fourth lumbar vertebra. Ultrasound guidance enabled one intervertebral space to be visualized (L5-S1), 3 cm from the expected spinal midline, and spinal anesthesia was performed at this interspace without any complications. A healthy infant was delivered, and the mother recovered uneventfully. Spinal anesthesia can be effectively performed in patients with poliomyelitis and severe kyphoscoliosis, that has been treated with extensive Harrington instrumentation. To facilitate regional techniques in such patients, bedside ultrasound may be greatly beneficial in identifying the correct spinal interspace.

**Database:** Medline

## **19. Caesarean section in a complicated case of central core disease.**

**Author(s):** Foster, R N; Boothroyd, K P

**Source:** Anaesthesia; May 2008; vol. 63 (no. 5); p. 544-547

**Publication Date:** May 2008

**Publication Type(s):** Case Reports Journal Article

Available in full text at [Anaesthesia](#) - from John Wiley and Sons

**Abstract:**We describe the anaesthetic management of a 21-year-old lady with central core disease for elective Caesarean section. Central core disease is characterised by muscle weakness, skeletal deformities and susceptibility to malignant hyperthermia. Total intravenous anaesthesia was used because of the combination of potential malignant hyperthermia, severe kyphoscoliosis and extensive spinal scarring. The authors believe there is no previous report of propofol and remifentanyl being used in these circumstances. A short review of central core disease and its anaesthetic implications is provided.

**Database:** Medline

## **20. Orthopedic issues in pregnancy**

**Author(s):** Smith M.W.; Marcus P.S.; Wurtz L.D.

**Source:** Obstetrical and Gynecological Survey; Feb 2008; vol. 63 (no. 2); p. 103-111

**Publication Date:** Feb 2008

**Publication Type(s):** Journal: Review

Available in full text at [Obstetrical and Gynecological Survey](#) - from Ovid

**Abstract:**Pregnancy taxes the musculoskeletal system. The enlarging gravid uterus alters the maternal body's center of gravity, mechanically stressing the axial and pelvic systems, and compounds the stresses that hormone level fluctuations and fluid retention exert. While the pregnant woman is prone to many musculoskeletal injuries, most can be controlled conservatively, but some require emergent surgical intervention. This article describes pregnancy-related orthopedic problems and related conditions, and discusses their pathogenesis, signs, symptoms, physical examination findings, diagnostic work-up, and interventions. Topics specifically covered include the following: pregnancy-related posterior pelvic pain (PRPPP), lumbar disc herniation with cauda equine syndrome, low back pain, kyphoscoliosis and scoliosis issues for anesthesia during pregnancy and delivery, pubic symphysis rupture, transient osteoporosis versus osteonecrosis, management of pregnancy after hip replacement surgery, and carpal tunnel syndrome. Specific musculoskeletal systems discussed in this article include the spine, pelvis, hip joint, and wrist. TARGET AUDIENCE: Obstetricians & Gynecologists, Family Physicians LEARNING OBJECTIVES: After completion of this article, the reader should be able to recall that there are many changes which occur during pregnancy that create a strain on the musculoskeletal system, explain that there are differences in the signs and symptoms in the presentation and differentiation of each of the maladies, and state that treatments vary depending on the acuteness and impairments created by the musculoskeletal disorder. © 2008 Lippincott Williams & Wilkins, Inc.

**Database:** EMBASE

### **21. Caesarean section in a patient with torsion dystonia.**

**Author(s):** Olufolabi, A J; Wee, M Y K

**Source:** British journal of anaesthesia; May 2006; vol. 96 (no. 5); p. 611-613

**Publication Date:** May 2006

**Publication Type(s):** Case Reports Journal Article

Available in full text at [BJA: British Journal of Anaesthesia](#) - from Oxford University Press ; Collection notes: To access please select Login with Athens and search and select NHS England as your institution before entering your NHS OpenAthens account details.

Available in full text at [British Journal of Anaesthesia](#) - from Highwire Press

**Abstract:**We present a case of torsion dystonia in a 35-yr-old primigravida who presented for a Caesarean section under general anaesthesia. She had limb contractures and severe kyphoscoliosis associated with limited respiratory reserve and function. General anaesthesia was induced using thiopental and divided doses of mivacurium for rapid sequence induction. After the delivery of a healthy male baby, she received i.v. morphine and bilateral iliohypogastric, ilioinguinal blocks and had an uneventful recovery. Technical issues of supine positioning, intubation and respiratory support need to be considered during anaesthesia planning. Although regional anaesthesia is commonly offered for caesarean section, maternal compromise and technical factors may preclude this approach.

**Database:** Medline

### **22. Pregnancy in kyphoscoliosis: benefit of non-invasive ventilatory support.**

**Author(s):** Reddy, R; Evans, E; Khoo, O; Allen, M B

**Source:** Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology; Apr 2005; vol. 25 (no. 3); p. 267-268

**Publication Date:** Apr 2005

**Publication Type(s):** Case Reports Journal Article

Available in full text at [Journal of Obstetrics and Gynaecology](#) - from Taylor & Francis

**Database:** Medline

### **23. Anesthesia for cesarean section in a patient with spinal muscular atrophy**

**Author(s):** Habib A.S.; Helsley S.E.; Millar S.; Deballi III P.; Muir H.A.

**Source:** Journal of Clinical Anesthesia; May 2004; vol. 16 (no. 3); p. 217-219

**Publication Date:** May 2004

**Publication Type(s):** Journal: Article

Available in full text at [Journal of Clinical Anesthesia](#) - from ProQuest

**Abstract:**We describe the anesthetic management for cesarean section and tubal ligation of a 23-year-old primipara with type II spinal muscular atrophy (benign Werdnig Hoffmann). She was wheelchair-bound, had severe restrictive lung disease, and severe kyphoscoliosis, with Harrington rods extending from the thoracic to the sacral spines. A general anesthetic was given. We used propofol and alfentanil for rapid-sequence induction of anesthesia. We did not use any muscle relaxants intraoperatively. Postoperative care was provided in the intensive care unit. The patient made a good recovery. © 2004 by Elsevier Inc.

**Database:** EMBASE

#### **24. Labor Analgesia for the Parturient with an Uncommon Disorder: A Common Dilemma in the Delivery Suite**

**Author(s):** Kuczkowski K.M.

**Source:** Obstetrical and Gynecological Survey; Dec 2003; vol. 58 (no. 12); p. 800-803

**Publication Date:** Dec 2003

**Publication Type(s):** Journal: Review

Available in full text at [Obstetrical & gynecological survey](#). - from Ovid

**Abstract:**There appears to be an absence of uniform guidelines for management of labor analgesia in pregnant patients with uncommon medical conditions such as Marfan's syndrome, Ehlers-Danlos syndrome, achondroplastic dwarfism, previous back surgery, and kyphoscoliosis. A Medline search for articles highlighting considerations for obstetric anesthesia in parturients with these disorders was performed. Because of the multiorgan involvement and varied presentations of these disorders, no uniform or routine obstetric anesthetic recommendations can be made. In the absence of uniform obstetric anesthesia guidelines for pregnant patients with Marfan's syndrome, Ehlers-Danlos syndrome, achondroplastic dwarfism, previous back surgery, and kyphoscoliosis, the decision whether to administer regional anesthesia (epidural labor analgesia) should be based on an individual risk-to-benefit ratio on a case-by-case basis.

**Database:** EMBASE

#### **25. Successful pregnancy in a patient with spinal muscular atrophy and severe kyphoscoliosis**

**Author(s):** Yim R.; Winslow C.; Kirschner K.; Parson J.; Murphy E.

**Source:** American Journal of Physical Medicine and Rehabilitation; Mar 2003; vol. 82 (no. 3); p. 222-225

**Publication Date:** Mar 2003

**Publication Type(s):** Journal: Article

Available in full text at [American Journal of Physical Medicine and Rehabilitation](#) - from Ovid

**Abstract:**Pregnancy imposes a load on the respiratory system that is usually easily assumed because of alterations in the thoracoabdominal architecture. It is presumed that the respiratory mechanical disadvantage of severe kyphoscoliosis and the muscle weakness of spinal muscular atrophy impede these adaptations sufficiently to preclude a successful gestation. We report the case of a successful pregnancy in a woman with spinal muscular atrophy, severe uncorrected scoliosis, and the lowest spirometric values reported in the literature without the use of ventilatory support. This patient demonstrates that women with severe kyphoscoliosis and a profound ventilatory limitation can carry a successful pregnancy well into the third trimester without requiring full ventilatory support.

**Database:** EMBASE

## **26. Impact of pregnancy on respiratory capacity in women with muscular dystrophy and kyphoscoliosis: A case report**

**Author(s):** Gamzu R.; Shenhav M.; Fainaru O.; Almog B.; Kupferminc M.; Lessing J.B.

**Source:** Journal of Reproductive Medicine for the Obstetrician and Gynecologist; 2002; vol. 47 (no. 1); p. 53-56

**Publication Date:** 2002

**Publication Type(s):** Journal: Article

**Abstract:**BACKGROUND: Restriction of the chest wall in pregnancy prevents adaptive physiologic hyperventilation. This in turn might gradually promote respiratory insufficiency. CASE: Two consecutive pregnancies occurred in a woman with severe kyphoscoliosis due to juvenile muscular dystrophy. The patient died postpartum. CONCLUSION: Pregnancies with restrictive lung diseases, including severe scoliosis and kyphoscoliosis, should be considered high risk and thus should be monitored and managed carefully.

**Database:** EMBASE

## **27. Doxorubicin-induced cardiomyopathy during pregnancy: Three case reports of anesthetic management for cesarean and vaginal delivery in two kyphoscoliotic patients**

**Author(s):** Pan P.H.; Moore C.H.

**Source:** Anesthesiology; 2002; vol. 97 (no. 2); p. 513-515

**Publication Date:** 2002

**Publication Type(s):** Journal: Article

Available in full text at [Anesthesiology](#). - from Ovid

Available in print at [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#) - from Anesthesiology

**Database:** EMBASE

## **28. Management of respiratory deterioration in a pregnant patient with severe kyphoscoliosis by non-invasive positive pressure ventilation**

**Author(s):** Kahler C.M.; Hogl B.; Habeler R.; Brezinka C.; Hamacher J.; Dienstl A.; Prior C.

**Source:** Wiener Klinische Wochenschrift; Oct 2002; vol. 114 (no. 19); p. 874-877

**Publication Date:** Oct 2002

**Publication Type(s):** Journal: Article

**Abstract:**The problem of kyphoscoliosis in combination with pregnancy is uncommon and published cases are rare. Until now, little and controversial information on the outcome, optimal management and course of pregnancy in patients with kyphoscoliosis has been available. The majority of maternal deaths seem to be attributed to cardiorespiratory failure, while obstetric complications account for relatively few complications. We present the case of a 34-year old pregnant woman with congenital kyphoscoliosis and a forced vital capacity (FVC) of about one liter. A further deterioration of lung function was expected. In fact, severe limitations in exercise capacity (bed rest), fatigue and hypersomnolence, as well as a severe increase in pulmonary hypertension occurred during the second and third trimester. Nasal intermittent positive pressure ventilation (NIPPV) with bilevel positive airway pressure (BiPAP) was started in the 20th week of gestation and adapted throughout pregnancy. Nasal BiPAP was well-tolerated and corrected exercise tolerance, fatigue and nocturnal oxygen desaturations. At 32 weeks of gestation, the patient was admitted for an elective Caesarean

section under combined spinal-epidural anaesthesia with ongoing NIPPV, and delivered a healthy baby. Home nocturnal ventilatory support was continued as nocturnal episodic desaturations were also assessed during the postpartum period. At time of discharge, the patient's exercise capacity and lung function were nearly equal to levels before pregnancy. We conclude that pregnancy in selected kyphoscoliotic patients with severe limitations in lung function is relatively safe for both the mother and the child when NIPPV is used for overcoming respiratory deterioration and for preventing further cardiorespiratory failure.

**Database:** EMBASE

### **29. Nasal ventilation in pregnancy: Treatment of nocturnal hypoventilation in a patient with kyphoscoliosis**

**Author(s):** Restricket L.J.; Clapp B.R.; Mikelsons C.; Wedzicha J.A.

**Source:** European Respiratory Journal; Nov 1997; vol. 10 (no. 11); p. 2657-2658

**Publication Date:** Nov 1997

**Publication Type(s):** Journal: Article

Available in full text at [European Respiratory Journal](#) - from Highwire Press

**Abstract:**The management of a young woman with congenital kyphoscoliosis, who developed symptomatic nocturnal hypoventilation during the third trimester of pregnancy, is described. Nasal intermittent positive pressure ventilation (NIPPV) was safely and effectively used to correct nocturnal hypoxaemia and hypercapnia from the 30th-36th week of gestation, when a healthy boy was delivered by Caesarean section. Following delivery, the mother no longer required NIPPV and returned to her prepregnancy level of activity.

**Database:** EMBASE

### **30. Management of kyphoscoliosis and respiratory failure in ventilatory dependent pregnancy.**

**Author(s):** Eckford, S D; Veale, A; Lake, Y

**Source:** Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology; Jun 1997; vol. 17 (no. 4); p. 374

**Publication Date:** Jun 1997

**Publication Type(s):** Journal Article

Available in full text at [Journal of Obstetrics and Gynaecology](#) - from Taylor & Francis

**Database:** Medline

### **31. Kyphoscoliosis complicating pregnancy.**

**Author(s):** To, W W; Wong, M W

**Source:** International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics; Nov 1996; vol. 55 (no. 2); p. 123-128

**Publication Date:** Nov 1996

**Publication Type(s):** Journal Article

**Abstract:** To assess whether the outcome of pregnancies complicated by kyphoscoliosis has improved with modern obstetric and orthopedic care. A total of 17 patients with 27 pregnancies complicated by kyphoscoliosis were identified from 91,498 pregnancies between 1980 and 1994 from the obstetric audit database. Their obstetric records and associated orthopedic records were carefully studied. The incidence of kyphoscoliosis complicating pregnancy in the study period was 0.029%. The mean age of these patients in their index pregnancy was 32.7 years (range 23-40), mean height 140.7 cm (range 126-163). The cause of the kyphoscoliosis included traumatic injury, spinal tuberculosis, infantile poliomyelitis and idiopathic kyphoscoliosis. Eight of the patients had previous spinal surgery. The vaginal delivery rate was high and none suffered any cardiorespiratory embarrassment. There was no maternal or perinatal mortality. The high maternal and perinatal risks associated with kyphoscoliosis reported in earlier literature is no longer valid. The high proportion of patients who had previous spinal surgery before pregnancy might be conducive to the avoidance of harassment and thus a favorable pregnancy outcome.

**Database:** Medline

### **32. Anaesthetic management of labour in two patients with Klippel-Feil syndrome**

**Author(s):** Singh D.; Mills G.H.; Caunt J.A.; Alderson J.D.

**Source:** International Journal of Obstetric Anesthesia; Jul 1996; vol. 5 (no. 3); p. 198-201

**Publication Date:** Jul 1996

**Publication Type(s):** Journal: Article

**Abstract:** Two patients with Type I Klippel-Feil syndrome presented at the antenatal clinic. The first patient, who suffered from sleep apnoea, was delivered of a healthy infant by vacuum extraction. The second, who was profoundly deaf and had marked kyphoscoliosis, developed pregnancy-induced hypertension and urinary tract infection and was delivered at 38 weeks by vacuum extraction. In both cases epidural analgesia was employed to allow pain relief during labour. Anaesthetic management of Klippel-Feil syndrome is discussed and the benefits of early anaesthetic assessment and continued involvement of senior anaesthetic and obstetric staff emphasized.

**Database:** EMBASE



### **33. Extradural anaesthesia for Caesarean section in achondroplasia**

**Author(s):** Wardall G.J.; Frame W.T.

**Source:** British Journal of Anaesthesia; 1990; vol. 64 (no. 3); p. 367-370

**Publication Date:** 1990

**Publication Type(s):** Journal: Article

**Abstract:**We describe the successful management of a 26-yr-old achondroplastic dwarf undergoing elective Caesarean section under extradural anaesthesia. The patient had marked thoracolumbar kyphoscoliosis and clinical features which suggested that tracheal intubation would prove difficult. Block sufficient for surgery required only 5 ml of 0.5% bupivacaine and, apart from an initial unilateral block and mild intraoperative hypotension, her perioperative course was uneventful.

**Database:** EMBASE

### **34. Management of respiratory failure complicating pregnancy in severe kyphoscoliosis: A new use for an old technique?**

**Author(s):** Sawicka E.H.; Spencer G.T.; Branthwaite M.A.

**Source:** British Journal of Diseases of the Chest; 1986; vol. 80 (no. 2); p. 191-196

**Publication Date:** 1986

**Publication Type(s):** Journal: Article

**Abstract:**Six cases with paralytic or early onset kyphoscoliosis who developed cardiorespiratory complications during pregnancy are described. Four of these were treated during or immediately after pregnancy with negative pressure ventilation. The use and advantages of this type of treatment to relieve respiratory and cardiac failure related to pregnancy in patients with kyphoscoliosis is discussed.

**Database:** EMBASE

### **35. Kyphoscoliosis and pregnancy**

**Author(s):** Lao T.T.; Yeung S.; Leung B.F.H.

**Source:** Journal of Obstetrics and Gynaecology; 1986; vol. 7 (no. 1); p. 11-15

**Publication Date:** 1986

**Publication Type(s):** Journal

Available in full text at [Journal of Obstetrics and Gynaecology](#) - from Taylor & Francis

**Abstract:**Ten pregnancies in eight women with kyphoscoliosis were managed in the Princess Margaret Hospital, Hong Kong, between 1976 and 1984. five patients were delivered by caesarean section, including four classical sections for malpresentation. Pre-operative and post-operative chest physiotherapy was given to all patients. There were no maternal deaths. Two patients had chest infections but none had cardiopulmonary failure. One baby died of respiratory distress syndrome. The role of active chest physiotherapy is emphasised.

**Database:** EMBASE

**36. Obstetrical lumbar epidural anesthesia in patients with previous posterior spinal fusion for kyphoscoliosis.**

**Author(s):** Feldstein, G; Ramanathan, S

**Source:** Anesthesia and analgesia; Jan 1985; vol. 64 (no. 1); p. 83-85

**Publication Date:** Jan 1985

**Publication Type(s):** Case Reports Journal Article

Available in full text at [Anesthesia and Analgesia](#) - from Ovid

**Database:** Medline

**37. Maternal mortality in pregnancies complicated by kyphoscoliosis**

**Author(s):** Kreitzer M.; Gregory M.

**Source:** The Journal of the Medical Society of New Jersey; Jan 1981; vol. 78 (no. 1); p. 36-38

**Publication Date:** Jan 1981

**Publication Type(s):** Journal: Article

**Database:** EMBASE

**38. A review of 50 pregnant patients with kyphoscoliosis.**

**Author(s):** Kopenhager, T

**Source:** British journal of obstetrics and gynaecology; Aug 1977; vol. 84 (no. 8); p. 585-587

**Publication Date:** Aug 1977

**Publication Type(s):** Journal Article

**Abstract:**An analysis of the obstetric and medical complications in 50 pregnant kyphoscoliotic patients is presented.

**Database:** Medline

**DISCLAIMER:** Results of database and or Internet searches are subject to the limitations of both the database(s) searched, and by your search request. It is the responsibility of the requestor to determine the accuracy, validity and interpretation of the results.

## Strategy 129874

#	Database	Search term	Results
1	Medline	(Kyphoscoliosis).ti,ab	1438
2	Medline	exp PREGNANCY/	801770
3	Medline	(pregnan*).ti,ab	415858
4	Medline	(2 OR 3)	887983
5	Medline	(1 AND 4)	116
6	EMBASE	(Kyphoscoliosis).ti,ab	1850
7	EMBASE	*KYPHOSCOLIOSIS/	766
8	EMBASE	(6 OR 7)	2068
9	EMBASE	exp PREGNANCY/	719975
10	EMBASE	(pregnan*).ti,ab	533783
11	EMBASE	(9 OR 10)	855034
12	EMBASE	(8 AND 11)	135
13	EMBASE	12	124
14	Medline	((severe OR marked) ADJ2 Kyphoscoliosis).ti,ab	300
15	Medline	(4 AND 14)	42
16	Medline	(kyphoscoliotic).ti,ab	136
17	Medline	(4 AND 16)	12