

## Posterior decompression and stabilization in a pregnant patient with traumatic lumbar fracture: A case report

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### ABSTRACT

Spine fractures with or without spinal cord injury in the pregnant population are rare, with few reported cases. A 25-year-old primigravida at 24 weeks of gestation presented after falling off a fast-moving motorcycle one month prior. She had sustained a severe back injury and had difficulty walking. Magnetic resonance imaging showed an acute kyphosis secondary to comminuted anterior wedge compression fractures of the L2 and L3 vertebral bodies and L2/3 disc involvement with retropulsion of the fracture fragments into the central canal resulting in severe central canal stenosis. After multidisciplinary discussion, the patient underwent posterior decompression, reduction and stabilization with pedicle screws. The patient had good neurological recovery at discharge and the pregnancy progressed normally. Three months later, at 39 weeks of gestation, the patient had an uneventful spontaneous delivery of a healthy baby. This case illustrates the importance of multidisciplinary management of spinal cord injury in a pregnant patient.

### 1. Introduction

Spine fractures with or without spinal cord injury (SCI) in the pregnant population are rare. There are just a few case reports and only a single systematic review. Severe spine trauma, if unattended, can lead to neurological deficit in the mother as well as a fatal outcome for the foetus [1–3]. The global incidence of SCI has been reported to be between 10.4 and 83 per million people per annum [4]. Spine surgery is indicated in selected patients and is the effective management for non-complicated spine fractures in pregnancy.

The purpose of this study is to report on the surgical management of a pregnant patient in the second trimester who presented with a compression lumbar fracture with severe canal stenosis. She underwent laminectomy and posterior stabilization with instrumentation. We comprehensively searched the literature and give a brief review here of the surgical, anaesthetic and obstetric considerations pertaining to this case.

### 2. Case Presentation

A 25-year-old primigravida at 24 weeks of gestation was brought to hospital after falling off a fast-moving motorcycle one month prior, when she sustained severe back injury which led to difficulty in walking. There was no history of abdominal pain, headaches, vaginal bleeding or loss of consciousness and the patient was clinically stable. Foetal monitoring and vaginal examination were unremarkable.

Local spinal examination revealed tenderness over the gibbus in the upper lumbar spine with mild weakness in the both lower limbs (power 4 out of 5) with both knee and ankle reflexes present. Obstetric ultrasound revealed a bulky uterus with a single viable intrauterine foetus at 24 weeks and 2 days of gestation by foetal biometry in cephalic presentation. Cardiac activity and foetal movement were noted and the placenta was growing from fundal anteriorly with adequate amniotic fluid quantitatively. A T2-weighted sagittal magnetic resonance image (Fig. 1a) demonstrated acute kyphosis secondary to comminuted anterior wedge compression fractures of L2 and L3 vertebral bodies with L2/3 disc involvement. Retropulsion of the fracture fragments into the

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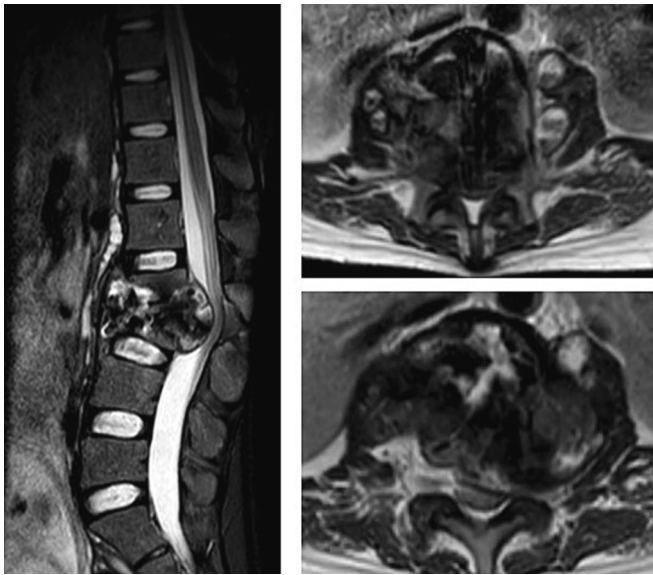
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**Fig. 1.** Figure 1 showing comminuted anterior wedge compression fractures of L2 and L3 vertebral bodies and severe canal stenosis at L2 and L3.

central canal had resulted in severe central canal stenosis, thecal sac and bilateral neural exit foramina nerve roots compression at that level (straight arrow). A T2-weighted axial image (Fig. 1b) showed round loculated hyperintense-hypointense fluid levels within the bilateral psoas muscles in keeping with haemorrhagic contusions (curved arrow).

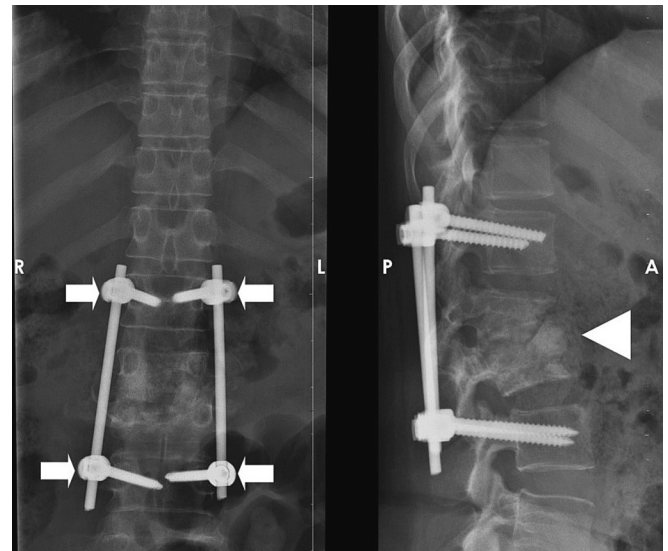
Multidisciplinary discussion with a team of neurosurgeons, obstetricians, cardiologists, radiologists and anaesthesiologists suggested surgical management - posterior stabilization and decompression within two days of admission. Basic pre-operative laboratory work-up was unremarkable and cardiac echo was normal.

The patient was placed in prone position with padded sponges in place to support and keep the abdomen free and so minimize maternal foetal circulation compromise. Intraoperatively, a posterior spinal approach was utilized and exposure of the posterior spinal elements was done with meticulous haemostasis; decompressive laminectomy was done and pedicle screw instrumentation with correction of local kyphosis was done under tightly collimated fluoroscopy.

Obstetric ultrasound immediately postoperatively revealed a viable foetus with normal cardiac activity and foetal movement. Postoperative examination revealed improved power (5/5) in both lower limbs and the patient was able to walk without support. Considering the time of presentation and risk-benefit ratio, steroids were not used at any point. The patient was discharged on day 5 with instructions from the obstetrics and physiotherapy teams. Three months after the surgery, the patient delivered a single live baby at 39 weeks by normal vaginal delivery without any complications. At follow-up six months after surgery, lumbar x-rays (Fig. 2) showed pedicle screw fixation at the levels of the L1 and L4 vertebral bodies in situ on an antero-posterior view (straight arrows) with confirmed corrected kyphosis at the level of the L2/3 vertebral bodies on the lateral view image (arrowhead).

### 3. Discussion

Lumbar spinal fractures in pregnancy are rare and less frequent than those occurring in the thoraco-lumbar transition region [2,5-7]. The role of operative treatment of spine injuries in the non-pregnant has been reported in Tanzania [8]; however, this was the first case reported for a pregnant patient with spine fracture managed surgically. Surgical management of patients with this kind of injury has been documented and the presence of ongoing pregnancy was mentioned not to be a contraindication to surgery given the benefit risk-benefit ratio to the



**Fig. 2.** Figure 2 showing pedicle screw fixation at the levels of the L1 and L4 vertebral bodies in situ on an antero-posterior view (straight arrows) with confirmed corrected kyphosis at the level of the L2/3 vertebral bodies on the lateral view image (arrowhead).

patient and foetus [2,9,10]. Whereas most authors advocate early surgery in the setting of spinal fractures with neuro-compromise [11], in contrast the patient presented one month after injury and still benefitted from timely intervention. The multidisciplinary team of neurosurgeons, obstetricians, cardiologists, radiologists, anaesthesiologists, nurses, and physiotherapists contributed to the good neurosurgical and obstetric outcomes, a factor which has been strongly emphasized by many authors.

Several causes of spinal injury in the pregnant population have been mentioned, with motor traffic accidents as the most commonly reported cause, followed by falls from a height, gunshot wounds [1] as well as systematic osteoporosis of pregnancy [7,12] which tends to slowly improve postpartum [13]. In the present case, the patient presented with spine injury secondary to a fall from a fast-moving motorcycle. Given her relatively young age, osteoporosis is unlikely to have contributed to the fracture.

Gestational age and anaesthesia have to be considered while choosing the surgical approach and position. A comprehensive review by Bongetta et al. analysed the pros and cons of several approaches, including prone, lateral, three-quarters prone, supine and sitting positions employed in spine surgery in pregnancy, and the authors emphasized that the prone position was to be preferred in the second and third trimester [14]. In practice, the surgeon has to take into consideration of the gestation age and potential size of the foetus in choosing the surgical approach. Uvaraj et al. noted that whereas an anterior approach may be tried in the first trimester of pregnancy since anatomically the uterus is still mainly an intrapelvic organ, in the later trimesters of pregnancy, the inevitable increase in foetus volume and fundal height prevents the anterior approach, hence the need for posterior approach in the case by several groups [2,5,6]. In effect, prone positioning is the approach of choice in most spinal procedures in the second and third trimester given the direct access it offers to the pathology but also adequate space for the surgical manipulation, and with the use of padded sponges which minimize abdominal pressure, it offers comfort to the mother, and was the approach employed in the current case. Additionally, the anterior approach has also been employed by some authors. For example, Shnacke and colleagues performed an anterior thoracoscopic-assisted reduction and stabilization in left lateral position with single lung ventilation for a 24-year-old woman in the 19th week of gestation who was involved in a motorcycle accident and sustained a T8 vertebra

complete burst fracture (type AO A3.3) with a slight, yet clinically unapparent narrowing of the spinal canal and a T5 vertebra stable fracture (type AO A1.2). The postoperative course was uneventful, highlighting the possibility of avoiding prone position and minimising radiation in this group of patients [15].

With regard to radiation safety, the risk of ionizing radiation to the pregnant women has been well documented such that age at which the foetus is exposed and the dose of exposure are the major determinants of the described effects [2]. That noted, whereas exposure after 20 weeks has been reported to carry oncogenic effects, in contrast, exposure in the first trimester carries teratogenic effects [16], hence it is important for the treatment team to have all-round awareness and inform the patient. In line with minimising the use of radiation, Uvaraj and colleagues [7] described a radiation-free procedure for posterior stabilization of spine fractures in two prima gravida mothers in an early trimester utilising a hands-free technique relying on anatomical landmarks followed by post-operative MRI to confirm instrumentation position. In both cases good surgical and obstetric outcomes were reported. In the present case, the patient was well informed about the risk-benefit ratio of radiation exposure, and consented. We proceeded with posterior spine fixation performed with tightly collimated fluoroscopy guidance to ensure correct screw positioning, and no intraoperative neuromonitoring was used.

A systematic review analysed the mode of delivery of pregnant patients with SCI (12 cervical, 14 thoraco-lumbar injuries). Nineteen patients delivered vaginally whereas 5 underwent caesarean section; all patients delivered normal healthy babies [1]. This emphasized the safety and preference of vaginal delivery, as stated by many authors [2,17]. It is worth mentioning that autonomic dysreflexia has constantly been pointed out as an independent life-threatening complication of SCI, especially in high spinal injuries [9,17]. In the present case, the patient had a lower spinal injury, which lowered the risk of autonomic dysreflexia.

Conservative management has also been mentioned to have a role for pregnant patients with SCI. Physiologically, progression to normal delivery in such neuro-compromised patients is possible because the early stage of labour in gravid women depends on the action of hematogenic hormones, mainly oxytocin, on the uterus wall and does not require the uterine innervation [9]. In a systematic review by Aatic et al., 65% of the patients were managed conservatively with satisfactory outcomes [1]. Delayed referral was a major challenge in the present case (the patient reported more than one month after injury) probably due to fear of foetal loss, misconceptions about SCI, surgical management in pregnancy and risk of disability [17]. Gravid women with high spine injuries which carry a high risk of surgery managed conservatively have been reported to proceed to normal delivery, as in a case reported by Malomo in Nigeria [18].

#### 4. Conclusion

Surgical management of lumbar spine fractures with neuro-compromise can be achieved safely during pregnancy. This case illustrates the role of a multidisciplinary approach in the management of spine cord injury in the pregnant population in order to achieve optimal surgical and obstetric outcomes.

#### Contributors

James Lubuulwa contributed to patient care, conception of the case report, drafting of the manuscript, and revising the article critically for important intellectual content, and editing of the final manuscript.

Emmanuel Mwita contributed to patient care, conception of the case report and drafting of the manuscript.

Anton Manyanga contributed to patient care, conception of the case report and drafting of the manuscript.

David Sikambale contributed to patient care, conception of the case

report and drafting of the manuscript.

Happiness Mbena contributed to patient care and revising the article critically for important intellectual content.

Patrick Mayanja contributed to patient care and revising the article critically for important intellectual content.

Patrick Ngoya contributed to patient care and revising the article critically for important intellectual content.

All authors read and approved the final version of the manuscript.

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#### Patient consent

The patient consented to the publication of this report and the accompanying images.

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#### Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case report.

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