



Case Report

Update on open reduction and internal fixation of unstable pelvic fractures during pregnancy: case reports[☆]



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ABSTRACT

This article aims to report four cases of unstable pelvic fractures in pregnant women treated by open reduction and internal fixation.

Cases report: The study included four cases of pregnant women with unstable pelvic fractures; their outcomes were analyzed and discussed. Data were obtained from two University Hospitals. The mean age of women was 23 years; most (3/4) were primiparous, with a mean pregnancy age of 23 weeks. Two women had Malgaigne-type fractures and the other two had symphyseal disjunction associated with acetabular fractures. All fractures were treated surgically. One foetus was dead on admission to hospital. The other three developed well, along with their mothers. Good evolution was only possible with careful pre-, peri-, and postoperative care for the mother, as well as foetal assessment by a multidisciplinary team. In complex cases such as those presented in the present study, pre-, peri-, and postoperative care are mandatory, as well as the presence of a multidisciplinary team. The mother's life always takes priority in acute clinical pictures, as it offers the best chance of survival to both mother and child.

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Redução aberta e fixação interna em fraturas da pelve instáveis durante a gestação: relato de casos

R E S U M O

Palavras-chave:
Ossos pélvicos
Fraturas osséas
Gestação

O objetivo deste trabalho é relatar quatro casos de fraturas pélvicas instáveis em mulheres grávidas tratadas com redução aberta e fixação interna.

Relato dos casos: Foram considerados neste estudo quatro casos de mulheres gestantes com fraturas instáveis da pelve, sendo analisados e discutidos os seus desfechos. Os dados foram obtidos em dois hospitais universitários. A idade média das mulheres foi de 23 anos. A maioria delas (3/4) era primípara, com idade gestacional média de 23 semanas. Duas mulheres tiveram fraturas do tipo Malgaigne e as outras duas apresentaram disjunção da sínfise associada a fraturas do acetábulo. Todas as fraturas foram tratadas cirurgicamente. Um feto estava morto no momento da admissão ao hospital. Os outros três evoluíram bem, junto com suas mães. A boa evolução dos quadros só foi possível com o cuidado pré-, peri- e pós-operatório das gestantes e com a avaliação dos fetos por uma equipe multidisciplinar. Em casos complexos como os abordados neste artigo, são imprescindíveis os cuidados pré-, peri- e pós-operatórios, além da presença de uma equipe multidisciplinar. A vida da mãe tem sempre prioridade no quadro agudo, pois oferece a melhor chance de sobrevivência para a mãe e a criança.

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Introduction

Malgaigne described the double vertical fracture of the pelvis in a seminal article of 1855.¹ The fracture had occurred in a 34-year-old pregnant patient, who died in hospital during delivery.

Pelvic fractures are common injuries in a mechanized society, and often occur in younger people. It is a rare type of fracture during pregnancy among developed nations, as such patients are well protected by themselves and by society. The modern literature on pelvic fractures during pregnancy recommends only conservative treatment. We have not found any description of them during pregnancy, except for the surgical treatment of Malgaigne-type fractures.

This article aims to report four cases of unstable pelvic fractures in pregnant women treated by open reduction and internal fixation.

Report of cases

The study considered four cases of pregnant women with unstable pelvic fractures. Cases were retrospectively analyzed from two University Hospital records. Foetal and mothers conditions at the time of admittance, description of lesions of acetabular/pelvis fractures, type of fractures, performed surgery, pre, intra and post-operatively care, and mother and foetus outcomes were analyzed. The inclusion criteria were pregnant women with unstable pelvic fractures. A literature review considering the subject was performed.

Table 1 and Figs. 1–4 present demographic findings on the four patients and their foetus, including foetal and mothers conditions at the time of admittance, description of lesions

of acetabular/pelvis fractures/type of fractures, performed surgery, and mother and foetus outcomes were analyzed. The mean age of the women was 23 years; most of them (3/4) were primiparous with a mean pregnancy age of 23 weeks. Two (2/2) women had Malgaigne-type fractures and the other two (2/2) had symphyseal disjunction associated with acetabular fractures.

Considering the first case, the woman was 17 years old. Patient was run over and joined the emergence of hospital with back pain, pelvis pain and the inability to walk. She referred she was pregnant with ± 25 weeks, first baby. The radiological evaluation showed fracture with small wedging L4 and disjunction with pelvic right side ascension. Foetal ultrasound evaluation proven foetal viability with normal heartbeats. After two days, under general anaesthesia, she was operated with reduction of the disjunction and fixing it with two perpendicular plates. After surgery, she was monitored in orthopaedics and obstetrics clinic. At 37 weeks it was performed a caesarean, and a girl was born with 3140 g and Apgar 10. After follow-up of 15 years, mother and daughter are completely healthy (Harris Hip Score = 100).

In case 2, the woman was 25 years old. After a motorcycle fall, patient arrived unconscious in the hospital. Her family reports pregnancy status. Radiological examination showed disjunction with pelvic symphysis ascension. Obstetric ultrasound diagnosed foetal death with ± 16 weeks of gestation. After a week, with clinical and neurological release, surgery was performed with osteosynthesis with two perpendicular plates to fix the symphysis, and the sacral-iliac fixation was done with a plate and two screws. After two days, the patient was transferred to obstetrics, to voluntarily wait for the elimination of the foetus. The deliberate elimination did not occur, and then it was induced with oxytocin. Five days

Table 1 – Demographic findings on four patients and fetuses.

Patient	1	2	3	4
Age (years)	17	25	16	35
Number of pregnancies	Primiparous	Primiparous	Primiparous	Multiparous
Aetiology (mechanism)	Run over	Run over	Run over	Run over
Pregnancy age (weeks)	25	16	21	30
Type of fracture	Malgaigne	Malgaigne	Symphyseal disjunction + acetabular fracture	Symphyseal disjunction + acetabular fracture
Associated fractures	L4			
Loss of consciousness	No	Yes	No	Yes
Foetal ultrasound	+	+	+	+
CT scan	No	No	Yes	Yes
Foetal condition	Viable	Dead	Viable	Viable
APGAR score	10	0	9	9
Time elapsed until surgery	48 h	07 days	72 h	48 h
Type of anaesthesia	General	Epidural	Epidural	General
Type of osteosynthesis	2 plates on symphysis	2 plates on symphysis + sacroiliac plate	2 plates on symphysis + acetabular plate	Long pubic and acetabular plate
Delivery of baby	37 weeks/caesarean	02 weeks/induced foetal elimination	35 weeks/caesarean	36 weeks/caesarean
Foetal weight (g)	3140	0	2160	3090
Gender of baby	Female	Male	Female	Male
Follow-up	Mother and son are doing well	Mother is doing well	Mother and son are doing well	Mother and son are doing well
Harris Hip Score	100	100	98	98
Last follow-up (years)	15 years	15 years	9 years	4 years

after curettage was performed. After 15 years of follow up, the patient presents Harris Hip Score of 100.

In case 3, patient was 16 years old, committed by run over accident. Victim was admitted to the Emergency Room conscious and hemodynamically stable. Patient had pain in the pelvic girdle and hip mobilization of the left leg. Radiological examination showed pelvic disjunction with fracture of the left acetabulum. Uterine ultrasound showed the foetus with gestational age ± 21 weeks and normal heartbeat. After clinical compensation, patient was operated on the third day after the accident, with epidural block and ilium inguinal approach. The reduction and fixation of acetabular fracture was performed. The disjunction of the symphysis was performed with two orthogonal plates. Foetal monitoring was conducted throughout surgery. With 35 weeks of pregnancy, caesarean was performed, and a girl with 2160 g was born. After nine years of evolution Mother had HARRIS Hip Score of 98, and the child had normal development.

In case IV, the patient was 35 years old. The run over victim was admitted to the hospital unconscious. After radiological examination, it was found the presence of intrapelvic foetus with disjunction of the symphysis, and left the acetabular fracture. Uterine ultrasound diagnosed a viable foetus with 35 or 36 weeks of pregnancy. Two days later, in the same surgery, a caesarean was performed and the baby was born. The fixation of the symphysis fracture and disjunction were fixed with long shaped plate. The foetus was male and weighed 3090 g and received Apgar 9. After follow up of four years, the child was normal and the mother had HARRIS Hip Score 98.

Discussion

There are few reports on pelvic fractures during pregnancy. Aboutanos et al.² revised records of 29,066 pregnant women and reported that 148 (0.5%) were involved in automobile accidents. Leggon et al.³ reviewed 31 articles up to the year 2000, and found only 89 cases of pelvic fractures and 12 cases of acetabular fractures. Almog et al.⁴ reported that among 1345 acetabular or pelvic fractures, only 15 (1.1%) occurred in pregnant patients, and only four were surgically treated.

Leggon et al.³ reported in their review a mean age of 25 years (range, 18–41) among pregnant women. In our series, we found a similar mean age of 23 years. They also reported that the trauma mechanism comprised largely automobile accidents (73%) and being run over (13%). Aboutanos et al.² reported that most patients were drivers (70%). In all our four cases, the fracture mechanism was being run over by a vehicle.

Three patients were primiparous, and one patient was multiparous (three children). At the time of the trauma, two pregnancies were in the second trimester and two in the third trimester. Aboutanos et al.² reported a mean gestational age of 20 weeks, and Leggon et al.³ found 57% of mean gestational age during the third trimester.

Despite case reports of fractures regarded as simple in up to 50% of cases the result of falls and car crashes, the run-over mechanism usually produces more severe fractures (complex fractures). The pelvic ring was ruptured in all our cases. Two cases were regarded as Malgaigne fractures because of hemipelvic vertical rise; the other two presented with symphysis pubis disjunction associated with acetabular fracture. Two patients were unconscious on arrival at hospital.

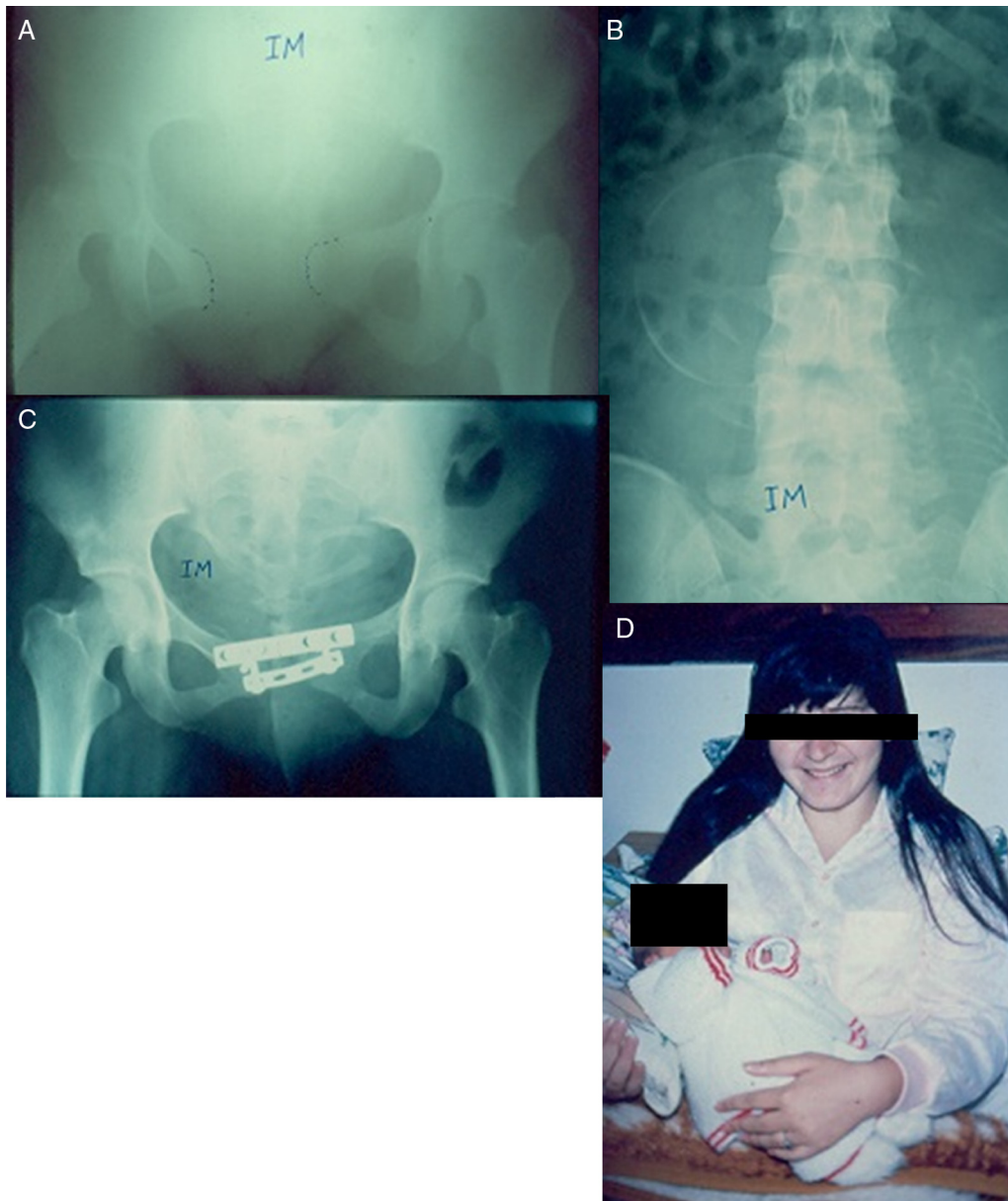


Fig. 1 – 17 years old, run over, 25 weeks of pregnancy. (A) pelvic X-ray on anteroposterior view presenting Malgaigne fracture; (B) lumbar X-ray showing the foetus; (C) post-operative X-ray; (D) mother and baby after delivery.

Aboutanos et al.² concluded that loss of consciousness has a significant impact on the foetal outcome. One of the patients also presented with vaginal bleeding, and ultrasound diagnosed foetal death. Ultrasound was also applied in the other three cases, proving that foetuses were alive and displaying normal cardiac activity. All patients were haemodynamically stable.

All cases had inlet and outlet radiographs for fracture evaluation. Two cases were assessed by computerized axial tomography. We know that X-rays have teratogenic and carcinogenic effects on the foetus;⁵ hence, radiological examinations must be performed with moderation, which may prevent adequate fracture study and thus jeopardize surgical planning. Computerized tomography can clearly show the

fracture pattern, but exposes the patient to a higher amount of radiation.

In no case was an image intensifier employed during surgical treatment. Porter et al.,⁶ when repairing eight acetabular fractures of pregnant patients, concluded that the use of radiographic images during surgical treatment, with a minimum risk to the baby, could be used on the attempt to obtain acceptable articular reductions.

Leggon et al.³ review found overall maternal mortality of 9% and overall foetal mortality of 35%. Several studies agree that, as a rule, the foetus has a higher death risk than the mother. Timberlake and McSwain⁷ reported maternal mortality of 8% and foetal mortality of 28%. Kissinger et al.⁸ reported maternal mortality of 3% and foetal mortality of 15%. Ali et al.⁹ found a

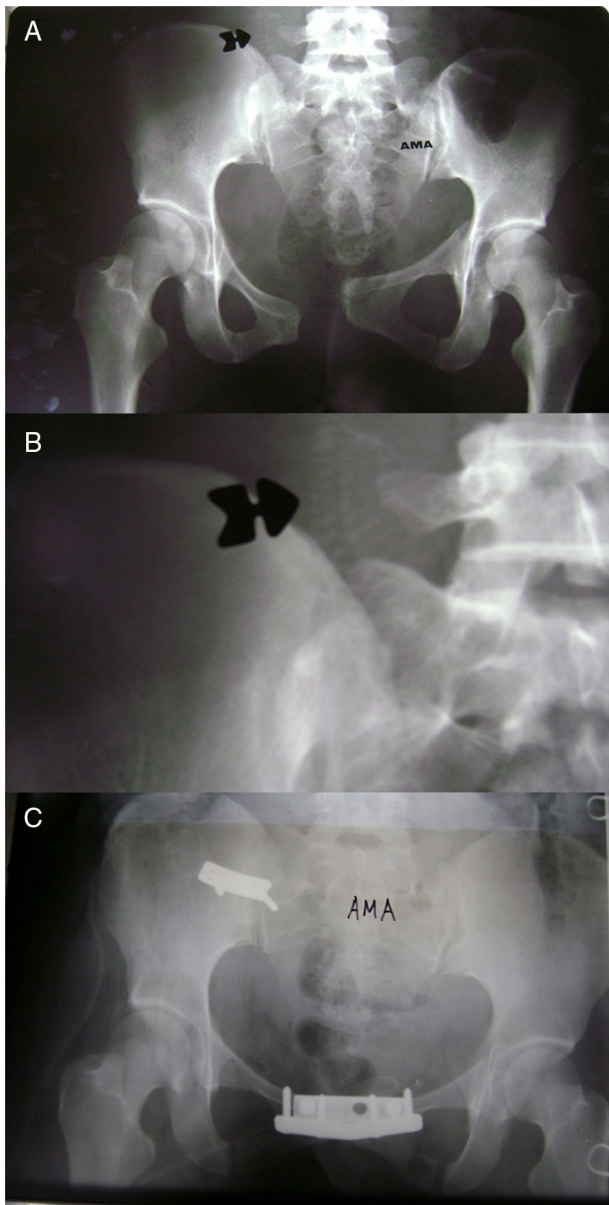


Fig. 2 – 25 years, run over, 16 weeks of pregnancy (the foetus died). (A) pelvic X-ray on anteroposterior view presenting Malgaigne fracture; (B) detail of X-ray showing the foetus; (C) post-operative pelvic X-ray: Malgaigne's fracture fixed with two symphysis pubis plates and one sacroiliac plate.

maternal mortality rate of 1.5% and a foetal mortality rate of 65%. Almog et al.⁴ reported a maternal mortality rate of 6.6% and a foetal mortality rate of 26.5%.

Many studies have analyzed the several predictors of foetal death. The statistically significant predictors include automobile-pedestrian run-over mechanism,^{3,10} maternal vehicle ejection during collision,^{5,10} elevated injury severity score (ISS),^{2,8,9,11} vaginal bleeding,¹² and severe maternal head injury.^{8,10}

During pregnancy, the high therapeutic demand of unstable pelvic ring fractures has tilted medical opinion towards



Fig. 3 – 16 years, run over, 21 weeks of pregnancy. (A) alar and (B) protusive X-rays of the symphyseal and acetabular fractures and the foetus; (C) post-operative X-ray presenting the symphyseal disjunction and acetabular fractures fixed with plates, and the complete recovery of the patient after nine years.

surgical treatment, with mother's consent, based on the mainstay of the therapeutic strategy, i.e., good maternal functional outcome and no effect on foetal health.⁶ The treatment of pelvic fractures associated with pregnancy was non-surgical in most cases in Leggon et al.³ literature review. This is a reflection of an era when most patients were treated conservatively, and most injuries were produced by low-energy accidents. Surgery on a pelvic or acetabular fracture in association with pregnancy was reported in only four published cases until 2001.¹³ The patient whose foetus died was operated after seven days. Surgical stabilization of her pelvic fracture was achieved with two symphysis pubis perpendicular plates and a sacroiliac stabilization plate. After waiting unsuccessfully for two weeks for spontaneous foetal elimination, the patient was subjected to uterine curettage. In the last ten years of follow-up she was regarded as having normal function, and scored 100 points on the Harris Hip Score. In the other three cases, the time until surgery was two days in two cases. The other case was operated 72 h after the accident. Surgical

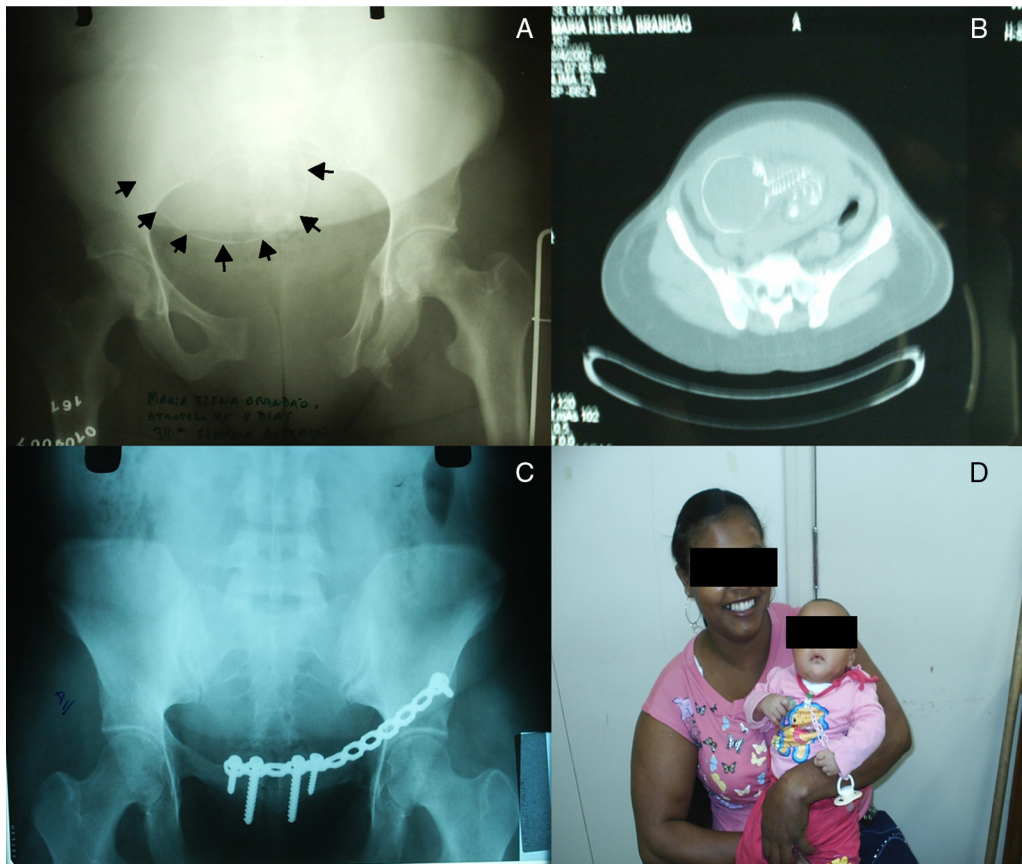


Fig. 4 – 35 years, run over, 30 weeks of pregnancy. (A) pelvic X-ray on anteroposterior view presenting symphyseal disjunction and acetabular fracture, and the foetus; (B) detail of the TC scan showing the foetus; (C) post-operative X-ray; (D) healthy mother and baby.

procedures for pelvic and acetabular fracture before delivery are rarely performed.^{3,4,8}

Until recently surgery was only employed in cases of postpartum diastasis.¹⁴⁻¹⁷ With conservative treatment the reduction is rarely anatomical, with possible formation of birth canal deformities,⁵ along with the fact that residual displacements are painful, there is a lengthy hospital stay, and complications are more common (infections, thromboembolism, decubitus ulcers). Riehl¹⁸ in a systematic review concluded that patients with pelvic fracture undergo caesarean section at a rate greater than those without prior pelvic fracture. The cause is not entirely understood but seems to be related to patient and obstetrician bias rather than solely to the pelvic fracture and cephalous pelvic disproportion.

Orthopaedic trauma in a pregnant patient must be managed in the same manner as in any trauma patient for the best outcome. A variety of stabilization methods for unstable pelvic ring fractures have been described with good clinical results.^{16,17} The second case of Malgaigne fracture was operated only for anterior symphysis pubis fixation, with two perpendicular plates. The patient underwent bed rest for 12 weeks until caesarean delivery, which occurred at 37 weeks.

The third and the fourth cases presented similar features in radiographs, with symphysis pubis disjunction and a transverse acetabular fracture. Both cases were treated by an anterior approach, albeit with different fixation types. In the third case, the symphysis pubis was fixated with two plates, and the acetabulum was treated with a moulded anterior plate. In the fourth case, the symphysis pubis and the acetabulum were fixated with one moulded long plate.

In the three last cases, all foetuses were delivered by Caesarean section, after 37, 35, and 36 weeks. Foetuses received Apgar scores of 10, 9, and 10, and weighed 3140, 2160, and 3090 g, respectively. Two cases received general anaesthesia, and two cases received an epidural block. Foetal heart monitoring was performed for the three live foetuses. The longest follow-up consisted of 12 years, and the shortest was two years. Three foetuses were viable and grew well. Two cases scored 100 points and two cases scored 98 points with the Harris Hip score.

All three cases of live foetuses thrived, along with their mothers. This was only made possible with careful pre-, per-, and postoperative mother and foetus assessment by a multi-specialty team. The mother's life always takes priority in the

acute setting as it offers the best chance of survival to both mother and child.

Conflicts of interest

The authors declare no conflicts of interest.

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