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Cervical avulsion during induced labour: diagnosis, intraoperative management and postoperative course

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SUMMARY

We report the presentation, operative management and follow-up of a 31-year-old nulliparous woman who experienced a cervical avulsion injury (CAI) during labour. The woman was induced with dinoprostone gel, followed by oxytocin infusion and had a prolonged active phase. During the second stage, fetal decelerations were noted and the consultant asked to make a plan for delivery. When assessing to perform a midpelvic instrumental delivery, a cord of tissue was felt below the fetal head. A caesarean delivery was recommended based on this finding. After delivery, injuries to the broad ligament, posterior lower uterine segment vagina and cervix were repaired. The cervix was retained with the intent that some tissue be salvaged. At 6-week follow-up, transvaginal ultrasound confirmed blood flow in the cervical tissue, though cervical insufficiency was suspected on clinical examination. Our findings reinforce the seriousness of CAI and support conservative surgical management as opposed to trachelectomy or hysterectomy.

BACKGROUND

Cervical avulsion injuries (CAIs) are uncommon but potentially life threatening. Many clinicians will never encounter one. With so few cases reported in the literature, risk factors are difficult to discern, though potential treatment injuries including ventouse birth and a history of cerclage placement in the pregnancy have been identified in a few of the cases reported.[1 2] When a CAI is diagnosed, definitive surgical management is frequently excisional rather than reparative. Our conservative surgical approach led to retention of the cervical tissue and the woman's uterus, suggesting that this approach is not only feasible but also may be preferable in women wanting to retain fertility.

CASE PRESENTATION

We report the clinical case, operative management and recovery from a CAI during induced labour.

The patient was a 31-year-old nulliparous woman at 41 weeks, 4 days gestation. She was undergoing induction of labour for late term gestational age. She was induced with one application of 2 mg of dinoprostone gel administered vaginally, followed by an oxytocin infusion per the hospital protocol. She experienced a protracted active phase with cervical examination changing from 6 cm, fully effaced and −1 station to full dilation and 0 station over the course of 11 hours. During the second stage, she was reviewed by the clinician and the foetus confirmed to be in direct occiput anterior position via both clinical examination and ultrasonography. One hour later, the clinician was asked to assess because of a change in fetal status. The cardiotocograph at this time exhibited a baseline rate of 160, with normal variability and recurrent variable decelerations lasting 2–3 min with each contraction. Only short periods at a normal baseline were noted between decelerations.

On clinical examination, the fetus remained in the occiput anterior position and at 0 station. During examination to assess for instrumental delivery, the clinician's hand was placed underneath the fetal head to assess the maternal pelvis. At this time, a cord of tissue was palpated directly underneath the fetal head.

DIFFERENTIAL DIAGNOSIS

On initial examination of the woman, the band of tissue palpated below the fetal head was thought to be a prolapsed umbilical cord as the size and quality of the structure was similar to what is palpated when a prolapsed cord is encountered. However, there was no pulse palpated in the tissue and a fetal scalp electrode was in place. An intrapartum stillbirth was considered (with the fetal scalp electrode recording the maternal pulse). However, the maternal heart rate differed from the rate being recorded by the fetal scalp electrode, indicating a live fetus. By deduction, the tissue had to be another structure.

The examiner followed the tissue to either side and found that it 'joined' the cervix at approximately 3 o'clock and 9 o'clock. Though the pelvis was thought to be adequate for vaginal birth, the examiner decided against performing a midpelvic instrumental birth using either forceps or ventouse. As the top differential was a CAI, performing an instrumental birth was considered to be contraindicated because of concern that the injury would extend or that the cervix would be completely amputated during the attempt.

In the room, the examiner thought the tear to be in the posterior cervix with the fetal head delivering through the os. However, at surgery, it became apparent that the 'tear' palpated below the fetal head was actually the cervical os and the fetal head was descending through an anterior avulsion of the cervix.

TREATMENT

A caesarean was performed which delivered the woman of a viable male infant, weight 3650 g, Apgar scores of 7 and 9 at 1 and 5 min, respectively. The uterus was exteriorised and the hysterotomy noted

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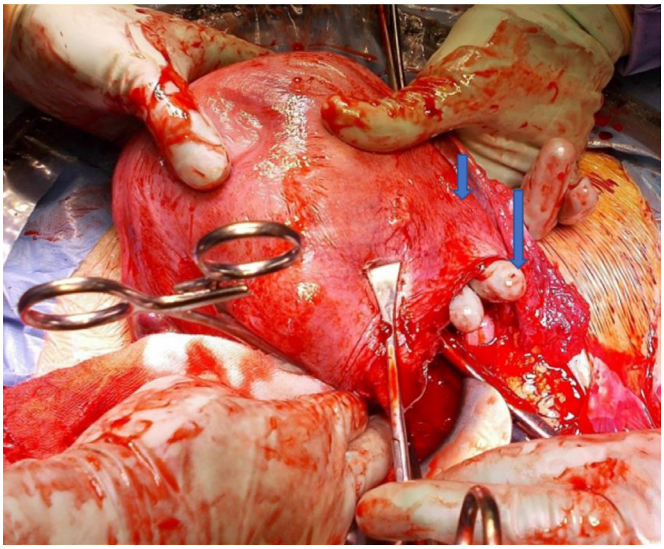

Figure 1 Exteriorised uterus after caesarean delivery. Surgeon's fingers placed through the tear which is separate from the hysterotomy. The tear extends from the vagina, through the maternal left uterine artery and to the insertion of the round ligament at the level of the utero-ovarian artery and vein. The tear also extends posteriorly and into the lower uterine segment in a transverse orientation (not pictured).

to be in the anterior lower uterine segment with an extension on the maternal right anteriolaterally. The extension did not involve other structures. Separate to the hysterotomy, a tear starting deep within the pelvis on the maternal left side was noted. This tear extended up through the broad ligament and just inferior to the utero-ovarian artery on this side (figure 1). The tear divided in the cervix to also circle around to the posterior uterus into a lower uterine segment extension. These tears were repaired with Vicryl. The uterine artery on the maternal left was interrupted and was hence suture ligated. After closure of the abdomen, the woman was placed in low Allen stirrups and the cervix examined. The cervix was confirmed to be avulsed anteriorly from approximately 4 o'clock to 8 o'clock (figure 2) and intact posteriorly (figure 2). A decision was made to reattach the cervix as it was unclear that the tissue was necrotic. This was done with both interrupted and running sutures. The repair was technically difficult due to the level at which the tear occurred close to the bladder and urethra as well as the tension that the avulsed portion had been placed under, leaving the distal portion lax in comparison to the caudal portion. A left-sided vaginal laceration approximately 5 cm in length extended from the upper vagina into the abdominal cavity (presumably connecting to the higher tears that had been repaired at the time of caesarean). This was sewn with Vicryl until the apex was closed and a finger could no longer be placed into the abdominal cavity. Cystoscopy was performed which confirmed ureteral egress bilaterally and showed no suture material in the bladder. Foley catheter and vaginal packing were left in at the completion of the case.

The entire case was able to be carried out using epidural anaesthesia, the catheter for which had been inserted prior for pain relief during labour. General anaesthesia was offered to the woman when the extent of injury was noted following delivery; however, she elected to continue with regional anaesthesia.

Oxytocin was given as a 5 IU slow bolus followed by 20 IU infusion over 4 hours, as per institutional protocol for caesarean births. 1 g of tranexamic acid was given prior to skin incision. The total intraoperative blood loss was 2200 mL and the woman received 3500 mL of plasmalyte 148 intraoperatively. A venous blood gas taken intraoperatively following 1 L of estimated blood loss was 115 g/L.

Postoperatively, the haemoglobin was found to be 71 g/L (admission haemoglobin was 140 g/L) and 1 unit packed red blood cells was infused in addition to a single dose of Ferric carboxymaltose. Haemoglobin improved to 89 g/L prior to discharge.

OUTCOME AND FOLLOW-UP

As expected, the recovery for this woman was not typical for a caesarean. She was seen by the surgeon and gynaecological oncologist postoperatively and examined. It was decided to continue with conservative management and not proceed to trachelectomy. At 2 weeks, the patient returned to the triage area feeling unwell and complaining of malodorous discharge. Examination confirmed some tissue slough but the cervix itself had tactile integrity. Some suture material was removed on this occasion but no further surgery performed.

At 6 weeks post partum, a transvaginal ultrasound was performed. Uterine and cervical anatomy appeared normal on ultrasound. The anterior cervical lip had a normal appearance of blood flow (figure 3). Clinically, the malodorous discharge had resolved by 10 weeks. On bimanual examination, the cervix

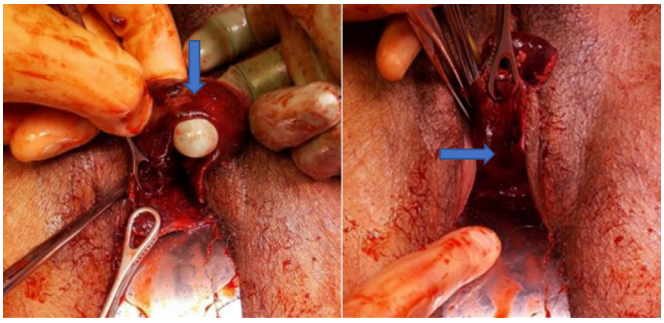

Figure 2 Cervix is avulsed anteriorly (first image) and confirmed to still be attached between approximately 4 o'clock and 8 o'clock (second image).

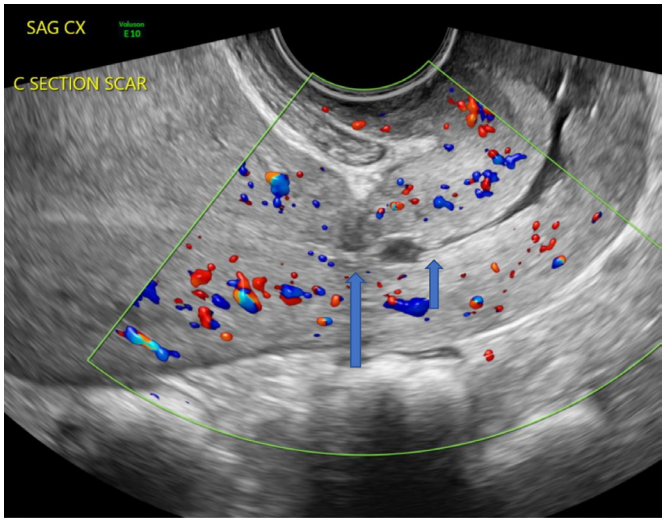

Figure 3 Ultrasound performed 6 weeks post surgery. Blood flow appears normal in anterior cervix. Long arrow: location of caesarean section scar, short arrow: suspected location of cervical avulsion repair.

easily admitted a finger and the impression is that there is likely cervical insufficiency as a result of the cervical avulsion.

DISCUSSION

Cervical avulsion during labour is an uncommon condition. The incidence is not known; however, uterine ruptures in women without prior caesarean scars may be the closest surrogate, and these occur in approximately 1:16 800 deliveries.[3] It would seem likely that elective caesarean birth would minimise the risk of these injuries. However, this approach can not be recommended because of the rarity of CAI in comparison to the frequency of complications encountered after caesarean.

The case reports that exist seem to focus on the life-threatening nature of bleeding from the maternal reproductive organs shortly after birth and on excisional management.[1 2] Authors from the USA report both trachelectomy as well as partial resection of cervical tissue followed by repair.[2] In both of these cases, the cervix was found to be either entirely or partially surgically absent at follow-up postpartum.[2] Historical reports, from the USA and Britain, also detail removal of the cervix as well as simple repair. In all cases, anatomy was altered at follow-up.[4 5] Concerningly, a report from Croatia detailed a case where cervical and internal tearing was diagnosed only at laparotomy.[1] In this case, an infant was delivered via ventouse with maternal haemorrhagic shock occurring postpartum. A posterior cervical rupture was noted in this case only once laparotomy was performed, with internal extension of the transverse cervical tear cephalad which separated the uterus from the sidewall and interrupted the uterine artery. In this report, the damage was considered too great for surgical repair, and a hysterectomy was performed.[1] Similar extensions between the cervical avulsion and the intraabdominal anatomic structures also occurred in our case, but we elected conservative surgical management rather than hysterectomy. We would submit that cervical avulsions should hence cause concern for additional, internal injuries that cannot be easily diagnosed via vaginal or abdominal examination. If one is encountered and the woman delivers vaginally, it would seem prudent to examine the upper vagina carefully to ensure there is not a high laceration extending into the abdominal cavity, as occurred in this case.

It is unknown how this woman would fare in a future pregnancy considering this complication in her first birth. We have not identified any literature as to likely outcomes and no guideline specifies what her management should be. Because of her cervical examination and the knowledge of how high in the cervix this avulsion occurred, we have recommended an abdominal cerclage for future pregnancies. This is for two reasons. The first being that a vaginal cerclage would likely be placed below the prior avulsion and may encourage rupture along the prior tear. The second being that the integrity of the tissue is now suspected to be reduced and placing a suture cephalad is likely to be more effective. We have recommended that this woman not attempt a vaginal birth after caesarean in future pregnancies. Considering the location of her cervical tear, her vaginal fornix tear and posterior lower uterine segment tear, we have advised her that there is an elevated risk of uterine rupture. If she agreed to an elective abdominal cerclage in a future pregnancy this would also necessitate a caesarean birth.

Patient's perspective

I was in labour and it was time to push the baby out. While doing that I was seen/examined by the doctor and something was not right, and it was probably explained at the time however I didn't understand then as I was exhausted and we agreed on an emergency C-section as we wanted to deliver the baby safely.

Forty minutes later my baby was born and I was in the operating theatre for a little longer as the doctors were fixing the complication I had. I only remember my anaesthetist offering me general anaesthesia which I declined and I asked for more shots of epidural during the extended surgery.

The care that I received by all three surgeons as well as my anaesthetist was beyond amazing. I remember seeing the doctor the very next morning post birth, she came in to explain what the surgery was about. Due to blood loss during birth and dropped haemoglobin I was given 1 unit of blood to improve the level of haemoglobin.

The doctors also did a follow up on day 4 post-partum to explain the performed surgery again and to also discuss the follow-up check-ups. It was very well explained, I was happy and glad to have them as my doctors that night.

The follow-up appointments went smooth, and I was explained the procedure if I wanted to hold any future pregnancies due to the cervical tear. I still cannot thank the doctors enough for saving my life and detecting the tear in time.

Learning points

- A cervical avulsion injury (CAI) is a rare phenomenon and may be life threatening.
- In cases where a CAI is encountered, careful attention should be paid to the upper vagina as extensions may occur into adjacent structures, including intra-abdominal organs such as the uterus, broad ligament and the blood supply that runs through these structures. A vaginal laceration that extends cephalad may indicate such an extension.
- Conservative, reparative management, rather than excisional treatments appears to be a viable option in some cases. This is especially important in women who wish to retain fertility.
- Due to the vascular nature of the reproductive organs, even significant injury will not necessarily cause necrosis. Repair and careful observation during recovery are feasible in some cases.

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Contributors MH: primary surgeon for the operative case (planning and conduct of management), primary write-up of the operative case. Liaison with the patient regarding the submission. WS: registrar who performed the operative case with the primary surgeon, postoperative coordination of care, input received regarding write-up of the case. LRC: anaesthetic registrar who performed the care for the woman. She contributed to the write up of the anaesthetic portion of the case. TD: second surgeon called in to assist in the operative case (planning and conduct of management), input received regarding write-up of the case.

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