

## Can Bandl's ring be recurrent?

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### Abstract

*Background:* Bandl's ring is a pathologic contraction ring of the uterus that is associated with obstructed labor.

*Case:* A 35-year-old with an uncomplicated past medical history was found to have a Bandl's ring in her first pregnancy during a cesarean section for failure to progress. During her subsequent pregnancy, what appeared to be a Bandl's ring was again found during repeat cesarean section after spontaneous labor.

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### Background

Bandl's ring is described as a ring of constricted tissue located at the junction of the thinned lower uterine segment and the thickened upper uterine segment.<sup>1</sup> This constriction ring can form distal to, or around the fetus and is

thus often associated with obstructed labor. Experts are conflicted on whether Bandl's ring is the cause or effect of obstructed labor<sup>1,2</sup> and reports of recurrent Bandl's ring are rare. Characterizing the incidence of Bandl's ring is challenging, as this pathology is infrequently reported. Incidences of Bandl's ring of 0.02% of live births and 0.15% of cesarean deliveries have been reported.<sup>3</sup> Early recognition and incision of Bandl's ring is imperative in the safe delivery of the infant, as it has been historically associated with mortality rates of up to 50%.<sup>3</sup> In this article, we present a case of recurrent Bandl's ring, once with prolonged labor and once in early labor.

### Case

Our patient was a healthy, 35-year-old G1P0 female who conceived after one round of in vitro fertilization. She had an uncomplicated pregnancy and presented at 40w2d with spontaneous

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labor. At this time, her sterile vaginal exam (SVE) was 2/50%/-1. Six hours later, she was 4-5/75%/0 with the fetus presenting occiput transverse. Her tracing was category one. She was placed in a side lying position and Pitocin was started. Four hours later her SVE was 5/80%/0. Her tracing continued to be category one and her fetus was found to be presenting with an asynclitic head. An intrauterine pressure catheter (IUPC) was placed. Two hours later, despite an adequate contraction pattern, her SVE was unchanged. The decision was made to proceed with a primary low transverse cesarean section due to failure to progress. During the procedure, the Bandl's ring was not initially recognized and a traditional hysterotomy was created, when the head could not be delivered, a Bandl's ring was diagnosed. The ring was present around the upper most aspect of the lower uterine segment with the fetal head inferior to the ring. Once recognized, the ring was incised vertically on either side of the hysterotomy. A male infant was delivered, weighing 3938 grams and presenting occiput posterior with an asynclitic head. APGAR scores were two and eight at one and five minutes respectively, and arterial cord gasses had a pH of 7.35. Upon closure, the hysterotomy was noted to have a left uterine extension. Both the patient and her son recovered appropriately and were discharged three days after delivery.

One and a half years later, our patient again conceived with IVF. Her pregnancy was uncomplicated until she developed gestational hypertension at 36w5d. She presented in latent labor at

36w6d. Due to her history of failure to progress and a 49% calculated chance of successful vaginal birth, the patient elected to undergo repeat low transverse cesarean section. Her cervix prior to delivery was 2/100%/-2. During this procedure, a Bandl's ring was again present with fetal head cephalad to the ring. The low transverse hysterotomy was made superior to the ring. A male infant weighing 3435 grams was delivered with APGAR scores of eight and nine at one and five minutes, respectively. Upon closure, a six-centimeter midline uterine extension was noted extending down from the ring. The patient and her son recovered appropriately and were discharged three days after delivery.

## **Discussion**

Bandl's ring is a presumably rare intrapartum uterine pathology that can have a large impact on labor management and fetal outcomes. While historically described in the literature, it is infrequently mentioned in modern obstetrics. The real frequency is not known because it is likely not recognized by the delivering obstetrician, as in our case initially. Among the limited number of publications, three case studies describe different presentations of Bandl's ring. One publication in 1974 describes a case of dysfunctional labor and unstable fetal lie resulting in cesarean delivery, at which time a constriction ring was found.<sup>4</sup> In 1994, a case of recurrent Bandl's ring after prolonged labor was reported.<sup>1</sup> In both cases, the patients had an uncomplicated antenatal course, prolonged labor, and delivered an

uncompromised fetus via cesarean section. In 2007, two cases of Bandl's ring causing intracranial trauma and subsequent cerebral palsy were reported.<sup>3</sup> In both cases, the fetus was delivered via cesarean section after prolonged labor. These cases were notable because they were the first published cases of Bandl's ring forming prior to labor and causing fetal trauma. The timeline of formation was confirmed in both cases by CT scan of the fetus after delivery that demonstrated edema and thrombosis prior to labor induction.<sup>3</sup> With these case reports in mind, it is challenging to determine, and thus counsel, patients regarding the timeline of formation of Bandl's ring. However, these prior studies suggest that recognition and delivery of the fetus via cesarean section can afford good outcomes, whereas prolonged constriction of a fetal part due to Bandl's ring can cause lasting damage.

In 1997, a retrospective case-control study compared patients with pathologic uterine rings to patients with vaginal or cesarean deliveries.<sup>2</sup> This study was performed with the goal of better characterizing the factors that potentially lead to the formation of Bandl's ring. Outcome variables included the length of stage I and II of labor, length of rupture of membranes, duration and maximum dose of oxytocin, and fetal head position. After comparing these groups, the authors found no difference in age, race, parity, gestational age, or birth weight. Among the clinical features that were assessed, patients in the vaginal delivery group had a shorter length of stage II of labor and more infants with a fetal head position of occiput anterior at the time of delivery.<sup>2</sup>

This analysis is the only published scientific trial on the topic of pathologic uterine contraction rings. Although limited by the rarity of Bandl's ring and thus small sample size (n=14), this trial suggests that demographic factors do not impact the likelihood of Bandl's ring. Furthermore, contrary to prior expert opinion, long length of stage I of labor, prolonged rupture of membranes, and use of oxytocin do not appear at higher rates in patients with Bandl's ring.<sup>2</sup>

Regardless of when Bandl's ring forms, identification of this pathology can greatly affect labor management. Unrecognized Bandl's ring can lead to difficulty at the time of delivery, preventing delivery of the head unless the ring is incised. In recent years, one published simulation has been developed for trainees, as a Bandl's ring may not be encountered during residency.<sup>5</sup> This simulation focused on identification of Bandl's ring after encountering a patient with a history of one previous uncomplicated vaginal delivery, now with labor dystocia and unsuccessful operative delivery. In addition, trainees were tasked with proper management of Bandl's ring in this simulation by appropriate use of hysterotomy extension and use of tocolytic agents.<sup>5</sup> Other proposed methods of recognizing Bandl's ring include ultrasound. Ultrasound has been used to visualize Bandl's ring successfully in labor<sup>6,7</sup> and could aid with early recognition and the decision to move forward with a cesarean section. Finally, providers should consider counseling patients with a history of Bandl's ring about possible recurrence, as in the case we have presented.

Once Bandl's ring is recognized in a laboring patient, treatment is relatively straightforward. A cesarean section with incision of the Bandl's ring must be performed. If the ring is not cut and the fetal biparietal diameter is inferior to the ring, the head cannot be delivered. Delay in recognition can prolong time to delivery and potentially cause fetal harm.

## **Conclusion**

Bandl's ring is a rare uterine pathology that can have a large impact on labor management and fetal outcomes. This case of probable recurrent Bandl's ring at time of repeat cesarean delivery supports the idea that Bandl's ring could form prior to prolonged labor and could possibly be the cause of prolonged labor.

Obstetricians need to consider the possibility of Bandl's ring when managing prolonged or protracted labor and be prepared to recognize and incise it at the time of cesarean section. In addition, both patients and providers need to be prepared for a recurrence of Bandl's ring in subsequent pregnancies. Given the rarity of the phenomenon, simulation for trainees is recommended.

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