

The 'sacral hand wedge': a cause of arrest of descent of the fetal head during vacuum assisted delivery

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During a study of 108 vacuum assisted deliveries, a fetal hand was detected in the pelvic space between the head and maternal sacrum in seven of the procedures. The larger presenting diameters resulting from the compound fetal presentations were reflected in a greater number of pulls and higher traction forces recorded during the deliveries. In all cases, extraction of the hand facilitated the completion of birth without causing serious injury to the fetus or maternal perineum. It is recommended that a digital examination to detect the presence of a fetal hand in the sacral space should become a part of standard vacuum delivery practice.

Introduction

The 'sacral hand wedge' is a term that describes a compound presentation of fetal head and hand, the latter descending with the head into the concavity of the sacrum and then impeding or causing arrest of further descent. During the second stage of labour, it is not unusual for birth attendants to observe the posterior arm prolapse through the introitus almost immediately following delivery of the fetal head. Such an observation was noted during the clinical evaluation phase of the OmniCup vacuum device (Clinical Innovations, Murray, Utah, USA)¹. For this reason, it was decided to include a vaginal examination to detect the presence of a fetal hand behind the head during a study of traction forces associated with vacuum delivery to determine what effect such a presentation may have on the outcome of the delivery and what management options might be effective. This short communication will focus on this aspect of the study. The results of the complete investigation will be analysed separately.

Methods

Operators were instructed to explore the concavity of the sacrum for the presence of a fetal hand when the head reached the level of the outlet of the pelvis during a prospective observational study of 108 vacuum deliveries. The fetal head was considered to be at the outlet when the vacuum cup was completely visible within the maternal introitus or had just emerged through the orifice. For the purposes of the study, vacuum delivery was divided into two phases. Phase 1 or *descent phase* was defined as that part of the procedure from the time of cup application when the cup was not visible or only partly visible within the vaginal introitus until the fetal head descended to the outlet of the pelvis. Phase 2 or *outlet phase* was the segment of the procedure from the time the cup was completely visible within the introitus to the time of delivery of the fetal head.

Obstetric data collected from each vacuum delivery included indication for the procedure, duration of the second stage of labour, duration of maternal pushing, station and position of the fetal head at the start of the vacuum attempt and birthweight of the infant. Procedural data included the number of tractions attempted with the device, maximum traction force reached during each contraction and site of application of the cup on the fetal scalp. Maternal and neonatal outcome data were also recorded.

The obstetric characteristics of the vacuum deliveries that were associated with the presence of a sacral hand were compared with those deliveries where a hand was not detected.

Statistical comparisons between the 'sacral hand present' group and the 'sacral hand not present' group were performed using student's *t* and χ^2 tests. A *P* value of <0.05 was considered statistically significant.

Results

A fetal hand was identified in the pelvic sacral space prior to the delivery of the fetal head in seven of the 108 vacuum assisted deliveries studied. The results are shown in Table 1. Arrest of descent was by far the most common indication for the procedure in the group with a sacral hand present but it was also the primary reason for all vacuum deliveries. Similarly, although there were more midpelvic and rotational deliveries in the sacral hand group, the differences were not statistically significant nor were there significant differences demonstrated with regard to the total duration of the second stage of labour or with the duration of maternal pushing.

The total number of pulls to achieve delivery was higher on average in the extractions associated with the presence of a sacral hand but the difference was not statistically significant. When the number of tractions was examined in relation to phases 1 and 2 of the vacuum procedure, it became apparent that this difference occurred mainly at the outlet. The average maximum traction force measured in the sacral hand group was significantly greater than that recorded for the remaining group. Although this differential was evident for both the descent and outlet phases of the deliveries, it was statistically significant only for the outlet phase. There was no difference in the average duration of the procedures calculated from the time of cup application to the time of completion of delivery.

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The average birthweight of the babies with a sacral hand was lower than that of the remaining group of infants but the difference was not statistically significant. With regard to neonatal injury one infant sustained a scalp blister measuring 1-2 cm that was located along the outer perimeter of the vacuum cup mark. In this infant, the application of the cup was deflexing and paramedian. There were no injuries to any of the fetal hands or arms resulting from the entrapment or the subsequent manipulations to free them. In the mothers, mediolateral episiotomy was performed in four women. One episiotomy was complicated by perineal and vaginal extensions that did not involve the anal sphincter or rectum. Episiotomy was not performed in three women. One of them, a primigravida, delivered an infant weighing 2840 g over an intact perineum. The other two women sustained second degree tears.

Discussion

The findings of this investigation should not be interpreted as being representative of vacuum delivery in general, since entry into the study depended on the availability of a separate observer, usually the author, to record the maximum traction force attained during each contraction. However, judging from the low number of outlet extractions and the relatively high proportion of rotational procedures attempted, it would appear that selection was biased, if anything, towards the more complex cases. Nevertheless, it is likely that the 'sacral hand' phenomenon described in this report is a relatively common cause of arrest of descent of the fetal head during vacuum assisted delivery. The findings also suggest that this type of presentation occurs more frequently than the 'classical' types of combined vertex and hand presentations described in the literature 2-4.

The compound nature of the fetal presentation resulting in larger presenting diameters was reflected in the greater number of pulls and the higher traction forces that were required to complete the delivery of the fetus. Initially, it came as a surprise to find that this increase in force and number of tractions was frequently recorded during the outlet phase of the vacuum delivery. However, the explanation may be that at this stage of the procedure the widest part of the fetal head is crossing the narrowest section of the maternal birth canal at the level of the pelvic floor and perineum.

Confirmation of the diagnosis was possible by digital examination once the head descended to the outlet of the pelvis by identifying a fetal hand in the space between the head and maternal sacrum. On one occasion, the presence of a sacral hand was suspected when the vacuum cup was observed to shift to an off-centre position in the introitus during traction despite a correct cup application on the fetal scalp. Similarly, in another delivery, the cup was noted to move anteriorly toward the symphysis pubis, presumably because the posterior space was occupied by the hand. On a third occasion, when descent of the fetal head ceased abruptly at the perineum and shoulder dystocia was suspected, examination revealed a hand in the sacral space. In retrospect, the circumstances were not typical of shoulder dystocia since the arrest occurred before the widest diameters of the fetal head had emerged from the vaginal introitus. In the remaining cases, the diagnosis was confirmed by digital examination, a practice that was incorporated into standard vacuum delivery procedure specifically to detect the presence of a fetal hand.

Six of the mothers had already been moved into the lithotomy position for vacuum delivery before the sacral hand was identified and the seventh woman was repositioned

in readiness for the McRoberts manoeuvre when shoulder dystocia was suspected. Three of the women, all of whom were nulliparas, had been provided with epidural analgesia, and four others, two nulliparas and two multiparas, had received perineal infiltration with local anaesthetic agents. Irrespective of the type of analgesia administered, all seven of the sacral hands were successfully extracted prior to completion of delivery of the fetal head using the following technique. The operator inserted the index and middle fingers of one hand into the vagina behind the fetal head and identified the fetal fingers. The fingers were not grasped because of their slippery nature and because of the possibility of causing them injury. Instead, the operator's two fingers were slid over the fetal hand to secure the wrist between the index and middle fingers in much the same way as a fetal ankle is gripped when extracting a leg during breech delivery. Gentle traction was then applied on the wrist in the direction of the introitus and delivery of the posterior arm was achieved without excessive traction. When this was accomplished, the fetal arm lay alongside the head situated at the introitus. The delivery was then completed by a combination of traction on the vacuum cup and fetal arm.

It is noteworthy that despite the presence of a sacral hand the fetal head was still able to descend to the level of the outlet of the pelvis with only slightly more than average traction on the vacuum extractor. Furthermore, in five of the seven vacuum procedures, the head was malpositioned when the cup was applied yet autorotation occurred in four of them. In addition, the absence of severe maternal perineal injury associated with the compound fetal presentations was surprising but welcome outcome. In four of the women, a prior episiotomy had been performed. In one of those women, a multipara, the episiotomy extended into the perineum but did not injure the anal sphincter or rectum. The remaining three women, who were all nulliparas, did not receive an episiotomy. One of them delivered the fetal head and arm with an intact perineum; the other two women sustained second degree perineal tears.

Conclusion

Entrapment of a fetal hand in the confined space between the head and maternal sacrum appears to be a relatively common cause of arrest of descent of the head during vacuum assisted delivery. The greater number of pulls and higher traction force required to overcome the increased resistance resulting from the compound presentation may result in failure of the procedure, detachment of the cup and injury to the fetal scalp. On the other hand, timely recognition and careful extraction of the hand may facilitate delivery without causing significant injury to the fetus or maternal perineum. It is recommended that digital examination to detect the presence of a fetal hand in the sacral space should become a part of standard vacuum delivery practice.

References

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Accepted 10 July 2002