Genitourinary Injuries in the Newborn
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_background_: Circumcisions and cesarian sections are common procedures. Although complications to the newborn child fortunately are rare, it is important to emphasize the potential significance of this problem and its frequent iatrogenic etiology. The authors present 7 cases of genitourinary trauma in newborns, including surgical management and follow-up.

_methods_: The authors relate 7 recent cases of genitourinary trauma in newborns from a children's hospital in a major metropolitan area.

_results_: Case 1 and 2: Two infants suffered degloving injuries to both the prepuce and penile shaft from a Gomco clamp. Successful full-thickness skin grafting using the previously excised foreskin was used in 1 child. Case 3, 4, and 5: A Mogen clamp caused glans injuries in 3 infants. In 2, hemorrhage from the severed glans was controlled with topical epinephrine; the glans healed with a flattened appearance. Another infant sustained a laceration ventrally, requiring a delayed modified meatal advancement glanoplasty to correct the injury. Case 6: A male infant suffered a ventral slit and division of the ventral urethra before placement of a Gomco clamp. Formal hypospadias repair was required. Case 7: An emergent cesarean section resulted in a grade 4-perineal laceration in a female infant. The vaginal tear caused by the surgeon's finger, extended up to the posterior insertion of the cervix and into the rectum. The infant successfully underwent an emergent multilayered repair.

_conclusions_: Genitourinary trauma in the newborn is rare but often necessitates significant surgical intervention. Circumcision often is the causative event. There has been only 1 prior report of a perineal injury similar to case 7, with a fatal outcome.


INDEX WORDS: Newborn genitourinary trauma, circumcision injuries, birth trauma.

T_RAUMATIC INJURIES_ to the external genitalia in the newborn period are relatively infrequent. The medical literature is replete with reports of traumatic genital injury in older children mainly as a result of varying forms of accidental, self-inflicted, or abuse-related trauma. However, it is evident from the published literature that the newborn child belongs to a distinct group of patients who are victims of iatrogenic injuries more often than older children.

Circumcisions and cesarean sections are among the most common procedures performed in the United States. The controversy surrounding nonritual circumcisions continues to rage. Complications from circumcisions, the most frequently performed operation in the United States, and the treatment thereof, are elegantly covered elsewhere. Also, despite the reduction in morbidity and mortality from birth trauma, probably related to improved perinatal care, the actual incidence of external birth trauma has not always shown a proportionate decrease.

The purpose of this report is not to discuss the pros and cons of circumcision and cesarean section, but rather to highlight the iatrogenic nature of genitourinary injuries in the newborn. By themselves, these injuries usually are not life threatening but are a significant cause of anxiety for obstetricians, pediatricians, and the parents of the injured newborn child.

The possibility of serious morbidity, permanent disability, as well as litigation are all issues that compound the problem that the pediatric surgeon has to deal with. This report, which includes 7 cases referred to our center as well as 1 additional case submitted by another pediatric surgeon in response to a prior report of our seventh case, serves 3 purposes: (1) it highlights the iatrogenic nature of these injuries; (2) it provides management options, some of which have not been described previously; (3) it emphasizes the importance of reporting these injuries to gain broader experience so that practitioners who perform the majority of circumcisions and cesarean sections hopefully will institute appropriate preventive measures.

**MATERIALS AND METHODS**

All patients referred to the pediatric surgical service between July 1995 and June 1998 for genitourinary injuries were included. These patients were all newborn children (6 boys and 1 girl), and all sustained...
Fig 1. (A) Photograph and (B) diagram of a denudation injury (case 2). Too much penile skin was drawn up into the Gomco clamp and excised.

injuries related to either circumcision or cesarean section. We excluded injuries beyond the perinatal period (7 days). There were no other injuries in any of these neonates. There were no deaths in this series, and follow-up (1 to 4 years) examination showed satisfactory functional and cosmetic results. There were no immediate or delayed complications related to the salvage procedures. The cases are outlined below and are grouped together based on the mechanism of injury.

Cases 1 and 2

These 2 infants suffered degloving injuries to both the prepuce and penile shaft from a Gomco clamp. Too much skin had been drawn up and severed (Fig 1). In the first patient, the error was only realized after the skin had been disposed of, and it was noticed that there was a denuded area of penile shaft. This healed by secondary intention (Fig 2). In the second case, the previously excised foreskin was salvaged and successfully sewn on as a full-thickness skin graft. Both these patients had satisfactory healing. However, the child who underwent grafting recovered sooner, required fewer dressing changes that were painful, and we believe had a superior cosmetic result.

Cases 3, 4, and 5

A Mogen clamp caused glans injuries in these 3 neonates. The patients in cases 3 and 4 had minor amputations of the glans. In both cases, persistent hemorrhage from the severed glans drew attention to the injury. Hemostasis was achieved by intermittently placing a solution of epinephrine 1:1,000 on the bleeding glans using a cotton tipped applicator. The glans healed with a flattened appearance in both these patients. The patient in case 5 had, in addition to the partial glans amputation, a laceration that extended ventrally. A delayed modified meatal advancement glanoplasty was required at 6 months to correct the injury.

Case 6

This male infant had an injury to the ventral urethra before placement of a Gomco clamp. The pediatrician, in trying to get the bell of the Gomco clamp to fit, performed a ventral instead of dorsal slit, producing this injury (Fig 3). A formal tubularized, incised plate urethroplasty, as described by Snodgrass was required.

Case 7

This unfortunate female neonate sustained a grade 4 perineal laceration during an emergent cesarean section. The vaginal tear extended up to the posterior insertion of the cervix as well as into the rectum. The patient successfully underwent an emergent multilayered repair.

Based on the published report of this case, a pediatric surgeon from New York (see acknowledgment) submitted his experience with a very similar case. The injury in his patient was similarly caused by the obstetrician’s finger during a difficult and emergent cesarean section. The injury was almost identical with the exception of more swelling of the clitoris and urethral meatus. He similarly repaired this injury emergently with a successful outcome both functionally and cosmetically.

DISCUSSION

It is well known that trauma is a major cause of morbidity and mortality in the pediatric population. The newborn child is relatively spared from trauma until they are more mobile. Unfortunately, however, they are not as protected against iatrogenic injuries. Although genitourinary trauma is dealt with comprehensively in many reports, these series illustrate the rarity of noniatrogenic newborn genitourinary injuries. Circumcisions and birth trauma account for the majority of cases.

External birth trauma and its reporting varies from region to region. It is related to many factors, including, among others, increased fetal size; manipulation during difficult, prolonged, or instrumental deliveries; as well as varying perinatal practices. Cesarean section continues to be performed frequently to prevent birth trauma, and the rate of cesarean section in North America is the highest in the developed world. Many different system injuries related to both difficult deliveries and cesarean sections have been described, but the genitourinary system is involved infrequently. Most of these
injuries are relatively minor, e.g., bruising, and often go unreported. Breech delivery and the associated fetal manipulation have been associated with scrotal and testicular injuries. Bhat et al reported the first case in the literature of a fatal perineal tear in a female neonate from attempted breech delivery. A subsequent rectovaginal tear in a neonate after cesarean section (case 7) was reported by 2 of the current authors. Since then, we were made aware of a similar unpublished case, which was successfully salvaged by a pediatric surgeon (see...
acknowledgment). These 3 cases are the only 3 that we are aware of from a review of the English-language literature. This experience would indicate that prompt repair of these complex injuries by an experienced pediatric surgeon is essential for a successful outcome. From the report by Bhat et al,¹⁸ it appears that a significant delay accounted in large part for the fatal outcome from sepsis. This report hopefully will encourage others to report similar cases so we may better manage these devastating injuries and provide guidelines for the prevention of such iatrogenic trauma.

The majority of our cases involved circumcision-related trauma. Despite the heated debate over, as well as strong opinion about, nonritual circumcision,¹⁹-²³ this procedure, which is probably the oldest known surgical operation,¹⁰ will continue to be performed by many different specialties. As pediatric surgeons, we will continue to see the complications that arise, and it is therefore important to be aware of the possible injuries as well as options with regard to their management.

There are many isolated case reports of circumcision-related injuries. Most of these involve the various clamps that are available. The true incidence of these injuries is probably higher because relatively minor injuries may not be reported. The nature of the injury usually is either a degloving injury¹⁹ as in our first 2 cases (Figs 1 and 2), or, more commonly, some degree of amputation.²⁰-²⁴ In the series of degloving injuries by Sotolongo et al,¹⁹ they treat their patients nonoperatively with a satisfactory cosmetic outcome. We would agree with this for the most part, but would also suggest using the excised skin and prepuce if possible as a full-thickness skin graft for immediate coverage. This allowed for fewer painful dressing changes as well as a better cosmetic result in case 2 compared with the patient in case 1 (Fig 2) who was allowed to heal by secondary intention.

Amputation injuries can involve varying amounts of the penis with early reattachment shown to be successful.²¹,²³,²⁴ Sherman et al,²³ in their series of 7 cases, recommend reanastomosis even when there is a delay of surgical repair up to 8 hours. Izzidien²⁴ reported a case of successful replantation of a traumatically amputated penis in a neonate, without suturing the corpora and no reanastomosis of any vessels. The patients in cases 3 and 4 in our series had partial amputations of the glans only and healed with a flattened appearance. Interestingly, continued hemorrhage from the glans is what drew attention to these injuries, and this was readily controlled with topical epinephrine 1:1,000 solution. The patients in cases 5 and 6 had more extensive injuries and required formal hypospadias repair. Case 6 in particular (Fig 3) emphasizes the need for a thorough understanding of prepuce anatomy by primary care physicians who perform the majority of circumcisions.

Genitourinary injuries in the newborn fortunately are rare. However, because of their iatrogenic etiology as well as the assured continuation of common procedures like circumcision and cesarean section, these complications inevitably will occur. Nonetheless, they are preventable, and ongoing education of our nonsurgical colleagues is essential. Furthermore, the reporting of these injuries is important so that we can better appreciate the incidence of these injuries as well as provide surgical options for pediatric surgeons and urologists who manage these injuries.

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REFERENCES