Successful Treatment With Enoxaparin of Glans Ischemia Due to Local Anesthesia After Circumcision

abstract

The severe ischemia or necrosis of the glans penis is a rarely seen complication after circumcision. We report the case of a 7-year-old boy with severe glans penis ischemia occurring 24 hours after circumcision with local anesthesia (0.1% xylocaine containing ephedrine). His hemogram and levels of proteins C and S and fibrinogen were normal, but the D-dimer level was higher than normal (2.57 mg/L; normal level 0–0.5 mg/L). Normal blood flow was indicated on color Doppler ultrasonography. The severe ischemia in the glans penis was successfully treated with subcutaneous injection of enoxaparin (low-molecular-weight heparin) for 5 days, and the appearance of the glans was close to normal on the fifth day. The patient did not require any surgical intervention and was discharged without sequelae. As a result, we consider that ischemia of the glans penis may initially be managed with enoxaparin, especially in cases in which the D-dimer level is higher than normal. Pediatrics 2013;131:e608–e611

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KEY WORDS

glans penis, ischemia, complication of circumcision, enoxaparin, D-dimer

ABBREVIATIONS

DPNB—dorsal penile nerve block
LMWH—low-molecular-weight heparin

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Circumcision is one of the oldest surgical procedures performed worldwide and is probably the most frequently performed elective surgical procedure among Muslim and Jewish people. After circumcision, the most common complications are meatal stenosis, hemorrhage, and infection. Other complications, such as chordae, ulceration and necrosis of the glans, and amputation of the glans penis, are rarely seen, but the complications of concealed penis and insufficient removal of the foreskin are fairly common.

Although circumcision is not technically difficult, it is accompanied by a rate of morbidity of 0.1% to 35% and can result in complications ranging from inconsequential to tragic.\(^1\)\(^2\)

Ischemia or necrosis of the glans penis is an uncommon but important postoperative complication. Ischemic complications usually take place as a result of a tight bandage applied to the circumcised area, trauma, inadvertent administration of vasoconstrictive solutions, diabetes mellitus, circumcision, or vasculitis.\(^3\)\(^4\) We describe the case of a child with severe ischemia in the glans penis after circumcision with local anesthetic containing a vasoconstrictor, in whom enoxaparin (low-molecular-weight heparin [LMWH]) was administered and a successful response was obtained.

**PATIENT PRESENTATION**

A 7-year-old boy was referred to our outpatient clinic with a painful swelling and discoloration of the glans penis. The patient had undergone circumcision with use of local anesthesia (0.1% xylocaine containing ephedrine) 1 day before admission at the referring hospital. His family said that cyanosis and edema occurred on the glans penis 24 hours after the circumcision. Physical examination revealed black and necrotic appearance of the glans penis and edema on the dorsal penile skin.

The urethra, corpus spongiosum, and both corpora cavernosa were flaccid (Fig 1). Urine passage was normal. Laboratory studies showed no signs of sickle cell anemia or other hematologic diseases. His hemogram and levels of proteins C and S and fibrinogen were normal but the D-dimer level was higher than normal (2.57 mg/L; normal 0–0.5 mg/L). To assess the depth and severity of the ischemic process, grayscale and color Doppler sonographic examination of the circumcised penis was performed by using a 7.5-MHz linear-array transducer connected to an ultrasonograph (Aplio XV, Toshiba, Tokyo, Japan). Both corpora spongiosa and cavernosa demonstrated normal tissue echogenicity. Thickenning and echogenicity of the surface of the glans penis were more pronounced than expected for simple edema. Color Doppler examination revealed the normal penile and glandular blood flow (Fig 2). Diagnosis of superficial glans ischemia was suggested, and a conservative treatment approach was chosen. On the first day, enoxaparin 2000 anti–factor Xa IU was injected subcutaneously in the abdomen. On the next 4 days, enoxaparin anti–factor Xa 50 IU/kg was injected subcutaneously as a single daily dose. At 48 hours after the beginning of enoxaparin treatment, the glans penis changed from black to a brownish color, and on the fifth day, the dark color had vanished (Fig 3). At the end of the fifth day, the D-dimer level was normal and enoxaparin treatment was stopped.

**DISCUSSION**

In children, severe ischemia or necrosis of the glans penis is rare. It occurs commonly as a result of circumcision, trauma, or the administration of vasoconstrictive solutions during circumcision.\(^5\)\(^6\) The diagnosis is usually based on the appearance of skin on the glans penis. Ischemia of the glans penis after circumcision commonly results from dorsal penile nerve block (DPNB) with local anesthetics and inadequate surgical technique or devices.\(^5\)\(^6\) In the presented case, although the precise cause of severe glandular ischemia was not known, it might have been secondary to the DPNB. The American Academy of Pediatrics recommends that the analgesia consist of general anesthesia with caudal blocks for postoperative pain relief. Different analgesic applications exist for circumcision, including topically applied lidocaine-prilocaine cream, DPNB, and subcutaneous ring blockage.\(^5\)\(^6\) DPNB is an effective analgesic technique and is widely used during circumcision. DPNB is, however; associated with some complications such as ischemia or necrosis of the glans penis.\(^7\) Because the dorsal penile arteries are end arteries, the use of vasoconstrictor drug–containing anesthetics such as epinephrine may cause glans penis ischemia or necrosis. Our patient had undergone circumcision with the use of local anesthesia supplied by DPNB (0.1% xylocaine containing ephedrine). His mother noticed a discoloration of the glans penis in her son after 1 day. When the boy was presented to our outpatient clinic, his glans penis was almost black (Figs 1 and 2). Ephedrine is a sympathomimetic drug, and it has a high potential for ischemia.
Therefore, when circumcision is performed with use of local anesthesia via DPNB, the use of local anesthetics containing a vasoconstrictor is contraindicated.

We measured the patient’s D-dimer level, which serves as a clinically useful marker for exclusion of venous thromboembolism. Elevated plasma levels of D-dimer antigen gradually normalize in patients receiving anticoagulant therapy for acute venous thromboembolism. Our patient had penile vascular thrombosis, and his D-dimer level was high. The decreased perfusion and localized ischemia may progress to tissue necrosis. The safety of the LMWH enoxaparin as an anticoagulant in newborns and children has been demonstrated, and it is indicated for the primary prophylaxis and treatment of thromboembolism. It is administered via subcutaneous injection and requires regular monitoring of anti–factor Xa activity. We administered an LMWH (enoxaparin) for treatment of this condition. At the end of the fifth day, the D-dimer level turned to a normal range. As in the current case, the main goal of the treatment is to provide sufficient blood flow and oxygen to the ischemic penis. Burke et al described ischemia of the glans penis occurring 40 minutes after DPNB with 0.75% ropivacaine and was successfully treated with an intravenous infusion of iloprost (a prostaglandin I2 analog). Aslan et al treated a child with penile glanular ischemia after circumcision with pentoxifylline. Sara and Lowry report 2 cases of gangrene of the skin of the glans penis after circumcision. These cases involved the use of general anesthesia and DPNB with bupivacaine without epinephrine. Sara and Lowry treated 1 case with heparin infusion, which was continued over 4 days, as a prophylactic measure to prevent the possible extension of the postulated thrombotic process. After several days, they observed that the color of the glans had returned to normal, and their patient was discharged from the hospital on the ninth postoperative day, without any residual defect of skin. In addition, Berens and Pontus reported the use of a caudal block to treat penile ischemia after circumcision with local anesthesia containing epinephrine. They suggested that the caudal anesthesia antagonized the epinephrine-induced vasoconstriction. In the present case, the patient presented to our outpatient clinic 1 day after circumcision. When we examined the boy, his glans penis was almost black. Therefore, we accepted this to be a case of delayed ischemia of the glans penis and we did not consider the caudal anesthesia as a treatment modality. However, in the literature we have not encountered any report demonstrating successful treatment of a child with penile glanular ischemia after circumcision with enoxaparin. In the present case, the black color of the glans penis transformed into a brownish color after enoxaparin treatment, and after 5 days, the dark color had disappeared (Fig 3). In conclusion, we suggest that enoxaparin, as an LMWH, should be considered as the treatment of choice in ischemia of the glans penis that develops secondary to the administration of vasoconstrictive solutions during circumcision. In addition, when the circumcision is performed with local anesthesia via DPNB, the local anesthesia should never contain a vasoconstrictor agent.
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