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Case Report

Risk of burn trauma during circumcision with radiofrequency scalpel: case report and review of literature

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Abstract: Male circumcision, one of the oldest and most frequent operations performed all over the world, removes 33–50% of the penile skin. Like each surgical procedure, circumcision can leads to complications ranging from the insignificant to the tragic. Circumcision methods can be done with different ways. The radiofrequency (RF) scalpel, an innovative instrument, can be used in circumcision. Here, we present three boys who sustained sever burn injuries during circumcision with RF method. In sum, interesting characteristics made RF procedures so popular in different fields of surgery. Although having low incidence, the important complications of this technology such as burns should raise our attentions. Performing radiofrequency circumcision by an experienced operator, selection of proper size of ground pads, and elimination of any interface between the skin and ground pad are the factors that can prevent such tragedies.

Keywords: Burns trauma, circumcision, radiofrequency

Introduction

Male circumcision, one of the oldest and commonest operations performed all over the world [1], removes 33–50% of the penile skin [2], and inner preputial epithelium that the glans is sufficiently uncovered [3]. Today, about 25% of total world male population is circumcised, largely concentrated in the United States, Canada, countries in the Middle East and Asia with Muslim populations, and large portions of Africa [1, 4]. Although protection from HIV infection, penile carcinoma, urinary tract infections and ulcerative sexually transmitted diseases [4], andpresence of definite indications for circumcision such as true phimosis, paraphimosis, and recurrent episodes of balanitis, most of the circumcisionsare performed due to social, ethical, and religious reasons [1, 3, 5]. Like each surgical procedure, circumcision can leads to complications, ranging from the insignificant to the tragic. Age at circumcision, experience of the provider, the sterility of the conditions under which the procedure is performed and the indication (medical/cultural) for circumcision are the factors which directly related to complications [5]. Although possibility of occurrence of seriouscomplications during circumcision such as; death from excess bleeding and amputation of the glans penis [5, 6], most of the early complications seem to be minor and treatable; pain [5], bleeding [3], swelling [5], excess or inadequate removal of tissue [3, 5]. Post-operative complications include pain, infection, urinary retention, meatitis, the skin bridge formation between the penile shaft and the glans, urethrocutaneous fistulas, inclusion cysts in the circumcision line, penile lymphedema, chordee, necrosis and slough of the glans or even entire penis hypospadias, epispadias, loss of penile sensitivity, and impotence following circumcision in adults [3, 5].

Circumcision methods can be done with four different methods or combinations thereof: dorsal slit, shield, clamp, and excision [3, 5].

Radiofrequency scalpel which is an innovative and minimally invasive instrument, allows cut-

Figure 1. The 4 year-old boy with sever burn injury of penis.

Figure 2. The 2 year-old boy with 2nd degree burn wound on shaft and glans of penis.

Figure 3. The 9 years old boy with 2nd degree burn wound on shaft and glans of penis.

ting and coagulating tissues in an atraumatic manner with flow of electrical current [7], and causes focused thermal energy to a targeted area can be used in circumcision due to its low incidence of side effects and complications [8]. Although complications occur only in approximately 2–12% of patients undergoing radiofrequency ablation [7]; it can cause dramatic damages to the patient in circumcision.

Case description

Here, we present three boys who sustained sever burn injuries during circumcision with RF method (ground plate connected to lower extremity), by an inexperienced operator, and in an outpatient setting, at the same day.

Case 1

The first patients was a 5 year-old boy who was taken to his physician after one day after circumcision due to abnormal skin color and some painful bullae on the procedure site, so the patient was admitted to the hospital and after conservative management for seven days, he presented a deep 3rd degree burn wound on penile glans and shaft (**Figure 1**).

After three weeks of wound care and appearance of good granulation tissue, skin grafting was performed for the patient. Three months later, there was some contour deformity and mild chordee was seen, so reconstruction was planned for the patient, after adolescence.

Case 2

The 2 year-old boypresented some painful blisters on site of circumcision 2 days after procedure, made them be admitted in the hospital for closer observation. Because of such deep and superficial 2nd degree wounds on penile glans and shaft of the penis (**Figure 2**), the patients underwent daily dressing, and finally they were discharged with mild acceptable chordee.

Case 3

After 24 hours after circumcision the 3rd patient, a 9 year-old boy, showed some painful blisters on the glans and shaft of the penis; which led to a 2nd degree wound (**Figure 3**). After two weeks of hospital admission for conservative managements and daily dressing, he was discharged with mild acceptable contour deformity.

Discussion

RF involves flow of electrical alternating current between 100 KHz and 1 MHz through tissues [9, 10], which causes focused thermal energy to a targeted area [8]. Heating cells leads to tissue death immediately at high temperatures but at lower temperatures a longer time constant is required [10]. Having minimally invasive

character, target-selective approach, the possibility of outpatient treatment, and the relatively low incidence of side effects and complications [11] made radiofrequency the method of choice in some surgeries [9]. Although RF ablation is typically used to treat cancer patients with virtually any solid primary and metastatic organ tumors such as; liver, lung, kidney, bone tumors [9], it can be used beyond oncology, such as for ligation of the umbilical cord of fetuses with twin-twin transfusion or selective reduction in complicated monochorionic pregnancies [12], treating the prostate glands of benign prostatic hyperplasia patients [10], the execution of every proctologic techniques [7], endometrial ablation [13], and management of chronic pain [11].

Complications occur in approximately 2–12% of patients undergoing radiofrequency ablation [16]. The most common complications associated with different clinical applications of RF can be mentioned as; focal pain, regional hemorrhage, abscess formation, infection, bowel perforation, and superficial skin burns [13]. Most such burns result from the faulty attachment of the patient ground plate, which provides a low-current-density pathway for the high frequency cautery current [14]. Undersized groundpads do not properly disperse the radiofrequencyheat over a wide enough area result in skin burns [8]. Similarly, skin burns may be conducted by incomplete contact between the grounding pad and the underlying skin On the other hand, skin burns have also been presented at theprobe insertion site [8]. Yamagami et al. described a patient who sustained focal skin burn damage to the insulating coating surrounding the ablation probe [15]. Bilchik et al. reported a patient who developed a third-degreeskin and abdominal wall burn during the tractablation portion of percutaneous ablation [15].

To make a long story short, interesting characteristics made RF procedures so popular in different fields of surgery. Although having low incidence, the important complications of this technology such as burns should raise our attentions. Performing radiofrequency circumcision by an experienced operator, selection of proper size of ground pads, and elimination of any interface between the skin and ground pad are the factors that can prevent such tragedies.

Disclosure of conflict of interest

None declared.

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