



Survey On Intraoperative Penile Erections of Four Children

İntraoperatif Penil Ereksiyon Gelişen Dört Çocuğun Değerlendirilmesi

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SUMMARY

To survey the increased frequency of erections in our patients. Intraoperative course of the four patients were evaluated by using anesthesia protocols. We defined that some anesthetic drugs like fentanyl, remifentanyl, propofol and running out of volatile anesthetic might be the reasons. In one of these patients, caudal blockade was performed at the end of the operation that might be the reason. We performed some treatment procedures to cease the erections but complete detumescence had not been achieved. There are different treatment methods but we thought that adequately performed caudal blockade is the best.

Key Words: Penile erection, inguinal, children, treatment.

ÖZET

Hastalarımızda artan ereksiyon sıklığının sebebinin anlaşılması için gözden geçirme yapılmıştır. Dört hastanın ameliyat esnasındaki anestezi uygulamaları incelenmiştir. Bazı anestetiklerin, fentanil, remifentanil, propofol etkili olduğu ve volatil anestetik bitmesinin sebep olabileceği tespit edilmiştir. Bu hastaların birinde, kaudal blokaj ameliyat sonrasında uygulanmıştır ve ereksiyona sebep olabileceği düşünülmüştür. Ereksiyonu gidermek için bazı tedavi uygulamaları yapılmıştır; ancak tam düzelme sağlanamamıştır. Birçok farklı tedavi yöntemleri olmasına rağmen penil ereksiyon olmasını engellemek için en iyi yöntemin kaudal blokaj olduğu düşünülmektedir.

Anahtar Kelimeler: Penil ereksiyon, inguinal, çocuk, tedavi.

INTRODUCTION

Penile erection is a rare problem and mostly reported in adults during transurethral procedures or penile surgeries (1). The importance of the problem is pause and even postponing of operations. Level of general anesthesia, fentanyl, remifentanyl and propofol are some of the factors blamed for these erections (2-5). There are different treatment modalities like intracavernous alpha-adrenoceptor stimulating drugs, opiates, deepening the anesthesia, and subdartos injection defined in literature (2,6-8).

In the pediatric age group, this complication is seen occasionally (9). On the other hand, to our knowledge, our incidence is seemed to be higher

than other reports in the literature. Therefore, we decided to perform a survey on the etiology and our way of treatment to put forward the reason of penile erections by comparing the literature.

CASES

Premedications and Analgesia

All patients were premedicated with 0.5 mg/kg oral midazolam 30 minutes before surgeries. Five point sedation scale was used to demonstrate the appropriate sedation levels. Patients were taken in the operating theatre when sedations were 3 or more. Caudal blockades for pain management were performed with 0.5 mL/kg of 0.25 mg/mL bupivacaine shortly before the beginning of the operative proce-

dures, except case 4. For case 4, caudal blockade was performed at the end of the operation.

Case 1

Five years old patient was admitted for inguinal hernia. There was no history of specific diseases and abnormal physical examination. In the operation, 8% sevoflurane and 40/60% O₂/N₂O gas mixture was used for mask induction. After intravenous catheterization, 1 µg/kg of fentanyl was administered and endotracheal intubation was achieved. As a routine predilection, neuromuscular relaxant agent was not used for intubation and during the operative procedure. For maintenance of the anesthesia, sevoflurane 2% and 50/50% O₂/N₂O inhalation mixture was performed. At mid-operation (approximately 15 minutes after the anesthesia) penile erection was observed. Level of the anesthesia was checked and signs of alteration in the level of the general anesthesia like tachycardia, hypertension and pupil dilatation were not found. To eliminate the erection, 1 mg of midazolam and 20 µg fentanyl were administered intravenously. Three minutes later, detumescence was provided but in a minute time, dramatic recurrence was observed. We repeated the same midazolam dosage intravenously. The operation was paused for 5 minutes till the end of the erection and the surgery continued without any problem after then.

Case 2

Ten years old patient was operated for undescended testis. His physical examination and history was normal. For mask induction, 8% sevoflurane 40/60% of O₂/N₂O gas mixture was used. After intravenous catheterization, 1 µg/kg of fentanyl was administered and endotracheal intubation was achieved. Neuromuscular relaxant agent was not used for intubation and during the operation. For maintenance of the anesthesia, sevoflurane 2% and 50/50% O₂/N₂O inhalation mixture was preferred. In the beginning of the surgical procedures, erection was detected. There were no other signs of light general anesthesia as tachycardia, hypertension, and pupil dilatation. To eliminate the erection 1 mg of midazolam and 20 µg fentanyl was administered intravenously. The erection resolved very slowly. As a result, we repeated the dosage of midazolam and erection was over approximately 12 minutes later, and the surgery ended without any other trouble.

Case 3

Twelve years old patient was operated for inguinal hernia and circumcision. His physical examination and

history was also normal. Intravenous catheter was achieved and 2 mg/kg propofol, 1 µg/kg fentanyl was given intravenously for induction. Endotracheal intubation was performed successfully. Neuromuscular relaxation agent was not used. Sevoflurane 2% and 50/50% O₂/N₂O inhalation mixture was used to maintain the anesthesia. Inguinal hernia repair was performed uneventfully but penile erection was observed during the foreskin excision (Figure 1). As the patient had dilated pupil size without any other abnormal vital sign, we checked the anesthesia system and found little amount of sevoflurane in the vaporizer. Some anesthetic was added some immediately, 20 µg fentanyl was added intravenously to produce deeper anesthesia and 1 mg of midazolam was administered intravenously to treat the erection. In a few minutes, erection resolved and circumcision was finished. No any other problem or complications were seen after operation, and during recovery. Patient was discharged at the same day as standard procedure.

Case 4

Eleven years old patient was admitted to our pediatric surgery clinics with undescended testes. He had been diagnosed as Ellis-van Creveld (EvC) syndrome in genetics department of another university hospital. He had moderate mental retardation. In physical examination, he had short in stature, frontal bossing, hypertelorism and broad nasal root (Figure 2). Minor dental anomaly was detected. Mild skeletal disproportion was observed. Irregularity of short extremities was also noticeable. Polydactility and cardiac anomaly was absent. Testes were undescended and orchiopexy was planned.

Induction of anesthesia was performed with intravenous propofol 2 mg/kg fentanyl 1 µg/kg. We specifi-



Figure 1. Penile erection of case 3 during circumcision.

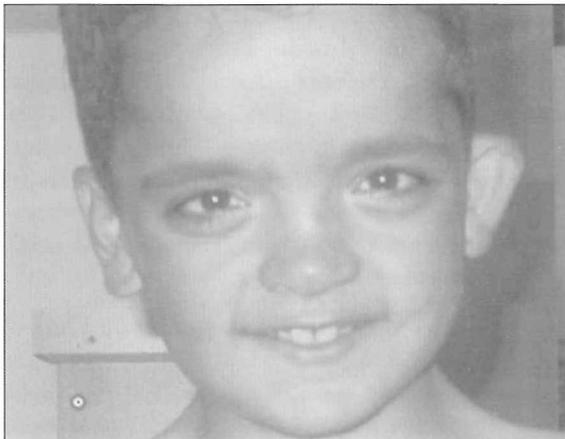


Figure 2. Frontal presentation of the patient.

cally used muscle relaxant, vecuronium bromide 0.1 mg/kg for this case and monitored the effectiveness of the muscle relaxant with a train-of-four nerve stimulator during the operation. Patient was intubated with 5 mm internal diameter cuffed endotracheal tube after 3 minutes of induction. Propofol infusion was set at 200 µg/kg/min for first 20 min and 150 µg/kg/min for the following 20 minutes. Simultaneously, remifentanyl infusion was set at 0.5 µg/kg/min. Level of the anesthesia was determined according to vital signs and pupil size during the operation. Shortly after the beginning of the surgery, penile erection was observed. Midazolam 1.5 mg and fentanyl 25 µg were given to treat the erection but detumescence could not be reached. Therefore, propofol with remifentanyl infusion was stopped and inhalation anesthesia with %2 sevoflurane and 50% N₂O-O₂ mixture was started. Temporary detumescence was noticed after this manipulation. At the end of the operation, caudal blockade with 0.5 mL/kg of %0.25 marcaine was applied and complete detumescence was observed.

DISCUSSION

Penile erection is a rare but known complication in urology which can be the reason of the operation discontinuance (2,10). The incidence is probably less than 1% in urologic procedures (10). In pediatric age group, it is also rare (9). In literature, we found only one child with penile erection reported during undescended testis operation (6). Besides, we reported two penile erection cases, cases 2 and 4, with undescended testis and, additionally, two other cases of inguinal region operation with penile erection in our same day surgery procedures. We realized that frequency of penile erection cases in our operations were seemed to be more than the literature and, therefore, we aimed

to evaluate the penile erection and its possible reasons in the light of the literature data.

Erection is essentially activated by parasympathetic system (10). Parasympathetic system is stimulated by tactile, audio-visual, gustatory, olfactory pathways originates from central nervous system and through genital organs (11). Erection coordination centers are thalamus, rhinencephalon, hippocampus, limbic system and hypothalamus (1). In conscious individuals, cortical centers may interrupt penile erection. Contrarily, general anesthetic agents may depress the cortical centers causing erectile response to tactile stimulation (8). During stage 2 anesthesia, heightened auditory sensation, taste and smells of the anesthetic drug may cause penile erection (2). For our patients, we first evaluated the levels of anesthesia for a possible decline after penile erections and anesthesia level alteration was only detected in case 3. We determined that anesthetic level in vaporizer was very low. Decline in the amount of sevoflurane level was the main cause of the erection which resolved after the suitable management.

Fentanyl usage might be a potential reason for erection in case 1,2 and also 3. There is little information about the activity of fentanyl for penile erection. Hosie and Todd reported that using high-doses of fentanyl like 40-50 µg/kg as infusion could cause penile erection with an incidence of 1% or higher (3). We used single and appropriate fentanyl dose in our patients. Consequently, fentanyl might not be the reason of erections for these patients.

In case 4, we used remifentanyl which was recently reported to be the cause for penile erection for children at the beginning of procedures (4). It was reported that patients were treated by volatile anesthetics to deepen the anesthesia and remifentanyl discontinuation (4). We also follow the same route for case 4 and achieved a partial success.

Propofol was reported to be another reason for erection. Propofol have direct and local effects both on the human corpus cavernosum (5). In a study, it was shown that voltage dependent Ca²⁺ channel might directly be inhibited by propofol and this could cause erection (5). Another explanation could be cross-potentialiation with the fentanyl facilitating the action of propofol to affect the central control of the erection (2). We used propofol for cases 3 and 4. In case 4, we used propofol because the patient was the first case with EvC syndrome to be operated in our clinics and we did not find comprehensive data for anesthesia of patients

with EvC. Therefore, we decided to perform anesthesia cautiously. When erection was seen, the propofol infusion was discontinued and inhalation anesthesia was begun. Consequently, we suggested that the main cause of the penile erections for these patients was propofol usage in case 4. For case 3, the main reason of penile erection was the sevoflurane abatement as we mentioned before but propofol usage might have an additional effect for the complication.

Erection resolved easily in case 3 but for case 4, erection was not fully resolved till the caudal blockade. Delayed caudal blockage was seemed to be reason for case 4 but we supposed that chromosomal anomaly might be another possibility in the occurrence of penile erection. EvC is an autosomal recessive disorder described in 1940 by Richard Ellis and Simon van Creveld (12). Parental consanguinity is 30% in all cases (12). There is no report for EvC patients with inguinal region operations and their complications. Also, the literature was very insufficient for the predisposition of the patients with chromosomal anomaly to penile erection during operations. Therefore, it is difficult for us to display a mechanism but chromosomal anomalies can have a facilitating effect on the penile erection thresholds.

Many treatment modalities were developed to solve penile erection. In a report, caudal blocks consisting 3 mL bupivacaine 0.25% with epinephrine followed by ropivacaine 0.2% 10 mL with clonidine 45 μ g and a penile block with two paramedian injections of bupivacaine 0.75% 1.4 mL to each sides were accepted to be successful to provide detumescence (9). In case 1,2 and 3, we performed caudal blockades with 0.5 mL/kg of 0.25 mg/mL bupivacaine before the surgical procedures and then erection was detected. We assumed that our caudal blockade may be insufficient. Density of the local anesthetics or a local problem like impaired venous drainage might be the reasons of insufficient caudal blockades (9). Also, during epidural anesthesia before a complete sensory blockade, suppression of adrenergic tone with the effect of cholinergic mediated neurotransmitters may cause tumescence (2). Consequently, we suggested that caudal blockades could not be accepted as a totally protective factor for penile erection. On the other hand, we used caudal epidural blockade in case 4 at the end of the operation and erection dramatically resolved. Adequately used caudal blockades might be accepted to be most efficient way of penile erection treatment.

There are some other methods for penile erection treatment. The dorsal penile nerve block was reported to be one of the treatment modality and this technique had less cardiovascular complications (8). Phenylephrine, metaraminol 10-25 μ g, anticholinergic glycopyrrolate, nitroglycerine and sodium nitropruside, diphenhydramine 25-50 mg, amyl nitrate, steroids, oral terbutaline in spinal cord injury, diazepam and midazolam under general anesthesia (1,2,6,10).

In conclusion, we experienced different kinds of penile erection reasons for our patients. Main reasons were seemed to be the anesthetics medications with remifentanyl, propofol and changes in anesthesia levels. Erection effects of these facts might be managed with different types of procedures for treatments but in our opinion, the best and easiest way for penile erection treatment is the caudal blockade if performed adequately.

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