

Case Report

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Intracavernosal ephedrine for management of intraoperative penile erection during urological procedure under general anesthesia

Nabin Krishna Yadav¹; Deepak Bhandari^{2*}; Subin Shrestha¹; Suresh Gautam¹

¹Consultant, Department of Anesthesia and Critical Care, Chitwan Medical College, Bharatpur, Nepal.

²Consultant, Department of Anesthesia and Critical Care, Bhaktapur District Hospital, Bhaktapur, Nepal.

*Corresponding Authors: Deepak Bhandari

Consultant, Department of Anesthesia and Critical Care, Bhaktapur District Hospital, Bhaktapur, Nepal.

Email: drbhandari.crc@gmail.com

Introduction

Intraoperative penile tumescence during urological procedure can occur after regional or general anesthesia. It is a rare event but can cause delay or defer of the surgery. Pathophysiology of intraoperative erection is mainly due to autonomic imbalance during anesthesia. Various physical and pharmacological management of tumescence have been tried with variable success and complication. We injected ephedrine 15 mg intracavernous resulting immediate de-tumescence and minimum complication.

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Background

Intraoperative penile erection or tumescence during endoscopic urological surgery is rare but troublesome complication. Intraoperative penile tumescence is described irrespective of the type of anesthetic technique used. The reported incidence is between of 0.1 to 2.4%. It has a rate of 0.34 to 3.5% during general anesthesia, 0.11 to 0.3% during spinal anesthesia and 1.72–3.8% during epidural anesthesia [1-5]. Intraoperative tumescence may prevent passage of urosurgical instrument and endoscopes leading to delay or even cancellation of the surgical procedure. Transurethral procedures during tumescence may increase the risk of bleeding, injury and stricture formation. In this paper we report a case of intra operative penile erection which was successfully managed by our team. Informed consent was obtained from the patient for publication of this case report. The identity of the patient is hidden.

Case presentation

A 25 years old male patient with ASA physical status 1 was diagnosed with right nephrolithiasis. He had a history of pain over right iliac fossa for past 3 months. Patient had no other comorbidities. He did not have history of penile dysfunction, dyspareunia or abnormal penile erection. There was no history of any drug intake. There was no history of past surgical intervention. Patient's general examination did not reveal any other abnormality. He was planned for right retrograde intrarenal surgery (RIRS) for management of right nephrolithiasis under general anesthesia. Patients had undergone pre-anesthesia evaluation which did not reveal any other problems. Patient was admitted in hospital a day before surgery and was advised for nil per oral for 8 hours before surgery. Patient was premedicated with midazolam of 2 mg and fentanyl 100 mcg. He was induced with propofol 100 mg and paralyzed with 50 mg ro-

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curonium. Bag and mask ventilation was done for three minutes while keeping volatile agent isoflurane at 2 percent. Patient was intubated with 7.5 size endotracheal tube. Patient was placed in modified lithotomy position for surgery. Immediately after placing patient in modified lithotomy position, he was found to have severe penile erection. This prevented the surgeons from passing urethroscope for surgery. Penile tumescence was successfully managed by intracavernous injection of 0.5 ml (15 mg) of ephedrine. Detumescence was achieved immediately within 1 minute. Rest of the operative and anesthesia procedure was uneventful and had smooth postoperative recovery.

Discussion

The penis is supplied by both autonomic and somatic nerves. The sympathetic pathways originate from thoracic level T10 to lumbar level L2 and supplies penile blood vessels and cavernosum smooth muscles. It is responsible for increase in intracellular calcium level resulting in smooth muscle contraction and thus maintenance of penis in flaccid state. This may be the rationale of administration of alpha-adrenergic agonist for management of erection. The parasympathetic pathways arise from Sacral level S2 to S4 and is mediated through pelvic plexus and cavernous nerves. This causes decrease in cytosolic calcium level, increase in blood inflow and occlusion of venous outflow causing penile tumescence [6].

Though exact mechanism of intraoperative erection is unclear, erection can be induced either psychological from the brain mainly limbic system via spinal cord or reflexogenically. As Sympathetic output from T10 –L2 is lost during regional and general anesthesia, reflexogenic erection is produced by stimulation of parasympathetic sacral (S2-S4) afferents by washing, touching and instrumentation of genital area during surgery. Erection is found to be more common in blocks higher than T8 and less in blocks lower than T12 [7]. Psychogenic stimulation may arise from heightened sensory input or dreams under anesthesia. Fentanyl and propofol, which are most commonly used drugs for induction of anesthesia have been found to cause higher incidence of erection during anesthesia [8,9].

Management of intraoperative penile erection

With increased understanding of physiology of penile tumescence many physical and pharmacological techniques have been described for the management of this condition. Rao et al. [10] managed two cases with cold sponging followed by terbutaline and one case with local application of cold saline and glycopyrrolate. Pertek et al. [7] managed intraoperative penile erection by performing dorsal penile nerve block with 8 ml of 0.25% bupivacaine injected into the subpubic space. Similarly saftel et al. [11] performed block with 5 ml of 1:1 mixture of 1% lignocaine and 0.5% bupivacaine. They say this technique can be repeated if needed and has lower risk of cardiovascular complication also provides postoperative analgesia.

Several pharmacological measures are used for the treatment of penile erection. Some are injected locally while some are given intravenous. Guler et al. [5] demonstrated detumescence by intravenous injection of 0.5 mcg/kg of dexmedetomidine over 3 minutes in 10 out of 12 patients with intraoperative penile erection without significant change in systolic blood pressure and heart rate. Ravindaram et al. and Gale et al. used 0.5

mg/kg of ketamine combined with 1.5 mg of physostigmine and 1 mg/kg of ketamine alone respectively to treat intraoperative tumescence but had increased blood pressure and prolonged onset of action [12,13]. Baraka et al. treated 6 patients of penile erection by intravenous diazepam 5-20 mg and midazolam 10 mg [14]. They purpose inhibitory effect of benzodiazepines at spinal cord level the cause of detumescence [14]. Vidyanathan et al. treated 2 cases with penile erection in cervical spinal cord injury patients using intravenous salbutamol 10 mcg [15]. They emphasize use of salbutamol therapy as desirable treatment option in case of cervical injury patient with penile erection and autonomic dysreflexia. This allows to achieve penile detumescence and prompt lowering of the blood pressure whom alpha agonist therapy is relatively contraindicated. Shantha et al. successfully treated 6 patient with penile erection due to injection of pharmacological agent with 5 mg oral terbutaline but should be used with caution in patient of ischemic heart disease, hypervolemia or hypokalemia [16].

Several studies have used alpha-adrenergic drugs injected locally into the corpus cavernosum for the treatment of intraoperative penile tumescence. These drugs have risk of systemic uptake with possibility of hypertension, pulmonary edema, myocardial and cerebrovascular incidents. Other problems with local injection are pain, hematoma, infection and fibrosis. Tsai et al. [17] injected 10-25 mcg metaraminol intracavernosum in 5 patient with penile erection. However two intraoperative deaths have been reported following intracavernosum injection of metaraminol which may have occurred owing to severe hypertension [18]. Dimitrios et al. [2] recommend intracorporeal injection of 250 mcg of phenylephrine for intraoperative penile erection which they tried in 3 patients. Staerman et al. [3] also managed intraoperative tumescence with intracavernous injection of 200mcg phenylephrine.

With our experience and further research, we found use of ephedrine better for management of intraoperative penile erection. Ephedrine is indirectly acting alpha agonist acting mainly on vascular smooth muscles [4]. It is readily available in operation theatre, easier to administer than other drugs or penile block. Intracavernous injection of ephedrine has lesser incidence of intraoperative hypertension and unlike benzodiazepines and dexmedetomidine is not associated with any respiratory depression. After penile erection is noticed inserted endoscope should be removed from urethra. Ephedrine, 30 mg in 1 ml is loaded in one ml syringe and 0.5 ml (15 mg) should be injected into one of the cavernosum. Firm pressure application and gentle massage over the injection site is recommended. The onset is rapid, and detumescence is immediate. If erection persists, remaining 0.5 ml of the drug can be injected in another cavernosum. The patient should be closely monitored including continual blood pressure measurement for at least an hour. All drugs to manage any hypertension or arrhythmia should be immediately available. We didn't encounter any hypertension after intracavernosum ephedrine injection, except minor bruising. The time of treatment of penile erection is a critical factor. The therapy must be quickly initiated to enhance venous drainage of cavernosum before prolonged venous stasis leads to increased viscosity and less readily detumescence.

Conclusion

Intraoperative penile tumescence is rare but troublesome complication during urologic surgery that may lead to delay or postponement of procedure. We suggest rapid acting intracavernous injection of ephedrine for de-tumescence with minimum complications. It is safe, effective, easily available and is familiar drug to those working in operation theatre.

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