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## CASE REPORT

## Postoperative drug-induced priapism

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Accepted 5 May 2017

**SUMMARY**

We presented a case of a postoperative patient with low-flow priapism, possibly initiated by propofol-based anaesthesia or epidural anaesthesia. The delay in diagnosing priapism resulted in emergency interventions with a partially successful effect and eventually permanent erectile dysfunction. Due to the delay in treatment, erectile dysfunction ensued and was manageable with medication; hence, the patient decided against a penile prosthesis.

**BACKGROUND**

Priapism is characterised by an unwanted prolonged erection and is a rare entity following abdominal surgery.<sup>1-2</sup> Only a few case reports describe an association with anaesthesia, either general or epidural anaesthesia.<sup>3-7</sup> The exact mechanism remains unclear, but prompt identification is vital to prevent permanent damage. Priapism is divided in two aetiological groups with their own level of urgency. Priapism may be secondary to a high-flow state resulting from direct trauma to the genitals, perineum or transurethral surgery.<sup>8</sup> The trauma induces an arteriosinusoidal fistula with a good chance of recovery with treatment. In contrast, low-flow priapism is a more common, urgent presentation secondary to medication, haematological or neurological disease.<sup>9</sup> In our case report, we expand briefly on the medication-induced priapism in relation to anaesthesia. This case illustrates the importance of prompt recognition and treatment of priapism to preserve erectile function.

**CASE PRESENTATION**

We present the case of a 58-year-old Caucasian man who underwent a laparoscopic right-sided hemicolectomy because of colon carcinoma, under general (propofol-based) anaesthesia in combination with epidural anaesthesia. The surgery was successful, and patient recovery was excellent according to the Early Recovery After Surgery (ERAS) protocol.<sup>10</sup> On arrival at the ward, the patient was hesitant to discuss penile complaints with attending female nurses. After 1 day of persistent painful erections, the patient notified the treating physician. On close inspection, painful engorgement of the penis in absence of sexual arousal was observed. The penis had an hourglass appearance of both corpora cavernosa (CC) distal to the base of the penis.

**INVESTIGATIONS**

Urology consult. A urologist was consulted and diagnosed the case as priapism, most likely

low-flow,<sup>1</sup> given the absence of a penile or perineal trauma or transurethral surgery. Bladder catheter was removed, and the epidural analgesia was discontinued. Evaluation after 4 hours showed no improvement of the erect state, therefore an emergency surgical intervention followed. At this time, the erection had persisted for approximately 48 hours.

**DIFFERENTIAL DIAGNOSIS**

The possible differential diagnoses of priapism include direct trauma, haematological diseases (eg, Sickle cell disease, unstable haemoglobin Hb Olmsted, thrombophilia, leukaemia), neurological disorders (eg, spinal cord injury, transverse myelitis and cerebrovascular disease), medication related (including antipsychotics, anticoagulants, anaesthesia and epidural analgesia) and others (eg, sildenafil citrate toxicity, Farby's disease, neoplasm, total parenteral nutrition, appendicitis, amyloid and rabies).<sup>1</sup>

**TREATMENT**

A glans-to-CC shunt was performed. Introduction of two large syringes in the CC followed by irrigation over a period of 2 hours with a combination of heparin, methylene blue and sympathomimetic drugs. Concentrations of the infusion were as follows: 5000 IE heparin, 80 mg ephedrine + 1 mg epinephrine + two ampoules of methylene blue. Given the preceding delay, results of the procedure were mediocre, although acceptable with a flaccid penis state and relief of pain.

The day after the shunt procedure, the penis achieved a full erection once more. One milligram of phenylephrine was injected in the corpora without a significant effect. Given the long duration of erection and mediocre treatment results, it was presumed that postoperative erectile function would be unsatisfactory, with loss of function of the CC, causing erectile dysfunction.

**OUTCOME AND FOLLOW-UP**

As suspected, our patient had erectile dysfunction after the episode of postoperative priapism. Regarding options for erectile dysfunction treatment, penis prosthesis was considered. After 6 months, the erectile dysfunction was manageable with medication; hence, the patient decided against a penile prosthesis.

**DISCUSSION**

Priapism is defined as an unwanted, prolonged penile erection or clitoral swelling<sup>3</sup> lasting for more than 6 hours, in the absence of sexual desire or



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**To cite:** Corten BJGA, Aarts F, Harms AS, et al. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2016-218060

## Learning from errors

**Table 1** Overview of priapism

	High flow (non-ischaemic)	Low flow (ischaemic)
Frequency	Uncommon (~5%)	Common (~95%)
Urgency	Non-urgent	Urgent
Aetiology	Direct trauma to penis or perineum Transurethral surgery	Medication •Antipsychotics (eg, risperidone, olanzapine) •Epidural analgesia •Anaesthesia (eg, propofol) •Anticoagulants (intravenous heparin, oral coumarins) •Phenothiazines, paroxetine, fluoxetine and trazodone, chronic cocaine abuse Haematological disease (eg, Sickle cell disease, unstable haemoglobin Hb Olmsted, thrombophilia, leukaemia) Neurological disorders (eg, spinal cord injury, transverse myelitis and cerebrovascular disease) Other (eg, sildenafil citrate toxicity, Farbrý's disease, neoplasm, total parenteral nutrition, appendicitis, amyloid and rabies)
Mechanism	Trauma-induced arteriosinusoidal fistula	Blood stasis due to venous outflow blockage
Pain	Painless tender	Painful
Plasticity	Semirigid	Hard
Initial therapy	Watchful waiting, mechanical compression, ice packing	Intracavernous aspiration
Secondary therapy	Intracavernous aspiration or selective arterial embolisation	Glans to corpora cavernosa shunt
Last-resort therapy		Cavernosphenous or open proximal cavernospongiosum shunt
Recovery	Mostly excellent	May result in erectile dysfunction

stimulation.<sup>1</sup> It is a rare complication after surgery, with only a few case reports available.<sup>3-7</sup> Priapism is classified into high flow (non-ischaemic) and low flow (ischaemic), based on the blood flow in the penis (table 1).<sup>1</sup>

High-flow priapism results from extensive arterial inflow due to injury of the corporal bodies creating an arteriosinusoidal fistula<sup>8</sup> between the cavernous artery and the lacunar spaces of the CC.<sup>9</sup> This injury results from direct trauma to the penis or perineum and usually cause the erection to be semirigid and painless compared with the low-flow state. In high-flow priapism, the penis is well oxygenated with blood gas values similar to arterial blood and can be confirmed by penile colour Doppler ultrasonography.<sup>9</sup> Initial therapy consists of watchful waiting, mechanical compression, ice packing, aspiration of the cavernous bodies and irrigation with alfa-adrenoreceptor.<sup>11 12</sup> If spontaneous detumescence fails, arterial embolisation of the cavernosa artery or internal pudendal artery should be considered.<sup>3</sup> Paradoxically, epidural analgesia can be the cause or treatment of this condition.<sup>13</sup>

Low-flow or veno-occlusive priapism is by far the most common form, especially in paediatric populations.<sup>9</sup> It results from blocking venous outflow and red blood cell stasis or sludging in haematological diseases.<sup>9</sup> Frequent causes are use of medication (eg, antipsychotics, anaesthesia and epidural analgesia), haematological diseases (most common Sickle cell disease, leukaemia) and neurological disorders in paediatric population (eg, spinal cord injury, transverse myelitis and cerebrovascular disease). Pain originates from tissue ischaemia and smooth muscle hypoxia. Histopathological changes occur initially with interstitial oedema (up to 12 hours) resulting in endothelial thrombotic adherence (by 24 hours) and finally lead to cell necrosis with or without fibrosis and calcifications (48 hours).<sup>1 14</sup> Prompt diagnosis and treatment of this urological emergency is imperative. Failing to do so, causes irreversible damage with fibrosis

and loss of penile tissue resulting in possible erectile dysfunction and impotence.<sup>9</sup> Treatment encompasses conservative management, such as exercise, ice and ejaculation preceding surgical intervention. Surgery is aimed at restoring arterial inflow and increasing venous outflow of the cavernosal bodies. Primarily, intervention involves intracavernosal blood aspiration and warm saline irrigation with local sympathomimetic drugs.<sup>1</sup> Aspiration and irrigation is successful in 77% of the cases.<sup>15</sup> If there is no improvement, then shunt therapy should be considered, which has an overall success rate of approximately 75%.<sup>16</sup> Surgery consists of shunting the distal glans into the CC, using either a surgical blade (Ebbehoj procedure<sup>17</sup>) or a biopsy needle (Winter procedure<sup>18</sup>). If this procedure is unsuccessful, cavernosphenous<sup>19</sup> or open proximal cavernospongiosum<sup>4</sup> shunting should be considered.

In our case, we suggest that in this case persistent erection was secondary to low-flow stat. Moreover, we can only speculate about the factors responsible for the priapism. It was most likely caused by either general or epidural anaesthesia or by a vicious circle that was initiated by the anaesthesia and a persisting erectile state causing permanent damage to the cavernous bodies. Absence of direct trauma, pain and a full erection hinted a state of low flow. To our knowledge, the patient did not have any haematological diseases. Several case reports indicate that surgery can be a primary cause for priapism<sup>4-7</sup>; however, we regarded it as less likely, given the location of the operation field relative to normal erectile physiology. Failed conservative treatment and discontinuation of the thoracic epidural analgesia suggested another culprit. We suspect propofol (2,6-diisopropylphenol), which was used during induction and surgery, based on the clinical presentation and available literature.<sup>20-22</sup> Unfortunately, the exact mechanism of propofol-induced and epidural analgesia priapism remains poorly understood.<sup>23</sup> An autonomic imbalance between blockage of sympathetic or parasympathetic neuronal centres, responsible

for physiological erections, underlies this pathophysiology.<sup>24</sup> The anaesthetic effect of propofol might block the sympathetic vasoconstrictor action or enhance the parasympathetic vasodilatory action causing priapism. Propofol is also known to influence the nitric oxide-mediated smooth muscle relaxation, modulate on GABA-A and adrenal steroidogenesis which contributes to the physiology of an erection.<sup>25 26</sup>

A total of 1662 mg of propofol administered by pump was used during the surgery. Additionally, intravenous 2.765 mg remifentanyl, 60 mg ropivacaine and 15 µg sufentanil were administered via the epidural space. Postoperative epidural settings were 16 mg ropivacaine and 4 µg sufentanil hourly.

This case gave rise to staff education concerning priapism, facilitating prompt identification of this rare complication. This case outcome underscores the importance of early diagnosis in the face of preventing permanent damage. Patients may feel embarrassed and hesitant to report penile complaints toward opposite gender medical professionals, and they could be afraid of stigmatisation.

We presented a case of a postoperative patient with low-flow priapism. We failed prompt identification and diagnosis, which resulted in emergency interventions with mediocre effect. Due to the delay in treatment, erectile dysfunction ensued and penis prosthesis was considered, although the patient decided against prosthesis hence the erectile dysfunction was manageable with medication.

### Learning points

- ▶ Postoperative priapism is a rare but significant event that may result in irreversible damage to penile tissue.
- ▶ Postoperative priapism usually results from low-flow priapism.
- ▶ Prompt identification of priapism is pivotal for favourable outcomes.
- ▶ Patients may feel embarrassed and hesitant to report penile complaints towards opposite gender medical professionals, and they could be afraid of stigmatisation.
- ▶ Staff education concerning priapism may facilitate prompt identification.

**Contributors** BJGAC: writing of case report. FA: performing surgeon and writing. ASH: performing anesthetist and drug-related addition. JV: performing surgeon and revision writing.

**Competing interests** None declared.

**Patient consent** Obtained.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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