2017

Priapism After Epidural or Spinal Anesthesia

Sarah Khalil
Western Michigan University Homer Stryker M.D. School of Medicine

Kelly Quesnelle
Western Michigan University Homer Stryker M.D. School of Medicine

Jeffrey Friedman
Western Michigan University Homer Stryker M.D. School of Medicine

Audrey Jensen
Western Michigan University Homer Stryker M.D. School of Medicine

Duncan Polot
Western Michigan University Homer Stryker M.D. School of Medicine

See next page for additional authors

Authors
Sarah Khalil, Kelly Quesnelle, Jeffrey Friedman, Audrey Jensen, Duncan Polot, and Sydney Spitler

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Jeffrey Friedman; Audrey Jensen; Sarah Khalil; Duncan Polot; Sydney Spitler
Joseph Costello MLS; Kelly Quesnelle PhD

Introduction

- Preoperative epidural and spinal anesthesia improves patient outcomes by reducing potential side effects of general anesthesia
- Rarely, patients develop priapism secondary to administration of the anesthetic agent
  - This is generally classified as high-flow priapism
- Little is known about the development of this complication
- There is no standardized management following onset

Rationale - A case of priapism following administration of epidural anesthesia in Kalamazoo, MI, at Bronson Methodist Hospital, prompted a search of the literature into the etiology, pathophysiology, and management of such cases

Methods

- Literature search of SCOPUS and PubMed
- Terms included: epidural anesthesia, spinal anesthesia, priapism, penile erection
- Inclusion criteria:
  - Case reports, case series, review papers about erections secondary to regional anesthesia
  - Pathophysiology and treatment of all-cause priapism
  - Physiology of innervation to the penis

Figure 1: Flowchart of studies included in review

Results

Author	Country	Procedure	Incidence Epidural	Incidence Spinal	Total Epidural	Total Spinal
Staerman[1]	France	Endoscopic	3 (3.85%)	1 (0.29%)	78	344
Guler[2]	Turkey	Transurethral	1 (1.72%)	8 (0.12%)	58	6872
Rao[3]	India	Transurethral	3 (0.17%)	N/A	1800	N/A
Baltogiannis[4]	Greece	Transurethral	3 (0.10%)	N/A	2867	N/A

Table 1: Reported incidence of priapism

Results

- Overall incidence of priapism in US is 0.2-0.3 cases/100,000
- Local anesthetics and opioids implicated as etiologic agents
- Selective inhibition of sympathetic innervation to the penis by anesthetic agents leads to unopposed parasympathetic innervation and subsequent erection
- Management depends on timing of erection onset
  - Withdrawal of inciting agent and pursuit of alternative analgesia
  - Intracavernous injection of α1-selective sympathomimetic agent
- Outcomes are generally unremarkable

Author	Patient Age	Initial Procedure	Anesthesia Technique	Agent	Level	Onset of Erection	Treatment	Outcome
Baltogiannis[4]	62	TURP	Epidural	Xylocaine	L4-L5	Within min	Phenylephrine	No AO
Baltogiannis[4]	41	Urethral stricture	Epidural	Bupivacaine with xylocaine	L3-L4	Within min	Phenylephrine	No AO
Brierly[5]	72	TURP	Spinal	NR	NR	2 min	Lidocaine + epinephrine	No AO
Miyabe[6]	59	TURP	Spinal	Tetracaine	T6	30 min	Ephedrine	No AO
Rao[3]	35	OIU	Epidural	Xylocaine	L4-L5	Immediate	Terbutaline	No AO
Rao[3]	35	OIU	Epidural	Xylocaine	L4-L5	Immediate	Terbutaline	No AO
Rao[3]	40	Cystopanendoscopy and L. ureterorendoscopy	Epidural	Bupivacaine with lignocaine	L3-L4	Immediate	Glycopyrrolate	NR
Benzon[7]	68	TURP	Spinal	NR	NR	Within min	Ketamine	Delayed Procedure
Valley[8]	60	TURB	Epidural	Lidocaine	L3-L4	Within min	Glycopyrrolate	No AO
Shantha[9]	76	TURP	Spinal	Tetracaine	L3-L4	Pre-urethroscope	Terbutaline	No AO
Shantha[9]	45	TURP and TURBT	Spinal	Lidocaine	L3-L4	Pre-urethroscope	Terbutaline	No AO
Benzon[7]	74	TURP	Spinal	NR	NR	Within min	Ketamine	No AO
Ruan[10]	49	Chronic Pain	Epidural	Bupivacaine with morphine	L3-L4	2 hours	Cease epidural	No AO
Jaganathan[11]	13	BFD osteotomies	Epidural	Bupivacaine	L2-L3	11.5 hours post insertion	Cease epidural	No AO
Pelavski[12]	6	Limb-lengthening	Epidural	Bupivacaine	L3-L4	1 hour	Cease epidural	No AO
Sniderman[13]	41	Chronic pain	Spinal	Bupivacaine	L3-L4	3 hours	NR	No AO
Hishmeh[14]	44	Total hip arthroplasty	Spinal	Morphine with fentanyl	NR	9 hours after cath removal	NR	NR
Baltogiannis[4]	58	TURP	Epidural	Xylocaine	L3-L4	Within min	Phenylephrine	No AO
Dubey[15]	57	TURP	Spinal	NR	NR	Immediate	Epinephrine	No AO
Natarajan[16]	59	TURP	Spinal	Bupivacaine	L3-L4	5 minutes post insertion	Glycopyrrolate	Delayed Procedure
Fransen van de Putte[17]	45	TA nephrectomy	Epidural	Bupivacaine	T11-T12	Within min	Cease epidural	No AO
Van Arsdalen[18]	60	TURP	Spinal	Tetracaine	L3-L4	After cytoscope insertion	Spinal at L4-L5	Delayed Procedure
Van Arsdalen[18]	63	Cystourethroscope	Spinal	Tetracaine	L3-L4	After cytoscope insertion	Ketamine	Delayed Procedure
Van Arsdalen[18]	55	Cystourethroscopy	Spinal	Tetracaine	L3-L4	After cytoscope insertion	Ketamine	Delayed Procedure

Table 2: *Case Reports of Regional Anesthesia-Induced Erection.* Abbreviations: TURP, transurethral resection of the prostate; TURB, transurethral resection of the bladder; TURBT, transurethral resection of bladder tumor, L, lumbar vertebra; T, thoracic vertebra; NR, not reported; IV, intravenous; AO, adverse outcome; Pre-urethroscope, before insertion of urethroscope; OIU, optical internal urethrotomy; BFD, bilateral femoral derotation; TA, transabdominal

Discussion

- The incidence of priapism following regional anesthesia is scarcely reported
  - Especially in the United States
- Most of these cases are reported in the context of urological procedures
  - Ability to compromise the procedure
- Local anesthetics such as bupivacaine are the most commonly reported agent
  - 2 cases with morphine
- Parasympathetic innervation to the penis causes erection through vasodilation
  - Sympathetic innervation causes flaccidity
- Priapism after regional anesthesia is thought to be due to an blockade sympathetic nervous system with uninhibited parasympathetic signaling
- A few cases also reported an increased risk of priapism when the procedure involved genital manipulation
  - Suggesting that a local reflex arc may be involved
- The standard of care treatment for intraoperative priapism is intracorporeal injection of selective α1 sympathomimetic with generally favorable outcomes

Conclusion

- Priapism due to epidural and spinal anesthesia remains a mysterious phenomenon
- Bupivacaine bolus doses were involved in multiple cases
  - May selectively inhibiting sympathetic tone to the penile vasculature
- Many factors to consider when treating this
  - Including procedural and patient characteristics

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