

Erectile Dysfunction Secondary to Pudendal Nerve Injury Complicating Orthopedic Surgery: Practical Recommendations

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Abstract

Erectile dysfunction (ED) resulting from direct damage of pudendal nerve injury during orthopedic surgery is common and closely associated to the use of traction tables. Prolonged countertraction on the fracture table and the inappropriate placement of the perineal post are the two main contributing factors. Clinical signs are essentially sensitive, such as hypoesthesia of the perineum. Urinary incontinence, ED and hypoesthesia or complete anesthesia of scrotum and glans penis are the main clinical manifestations. Electrophysiological examinations should be considered when symptoms are not regressive and in cases of vesico-sphincter dysfunction and immediate severe ED. No medical treatment has demonstrated its effectiveness. Pudendal nerve decompression was reported to be useful in some cases. Preventive measures should be considered by surgeons to avoid perineal traction injuries. Patients must be clearly informed about this possible neurological complication before an operation on the orthopedic table.

Keywords: Erectile dysfunction; Pudendal nerve; Injury; Orthopedic surgery

Introduction

Erectile dysfunction (ED) resulting from direct damage of pudendal nerve involved following orthopedic surgery is not uncommon; it can have serious medico-legal implications in addition being a distressful event for the patients. Excessive and/or prolonged traction against the perineal post of a traction table, leading to direct compression and localized ischemia to the nerve are the main contributing factors of injury. The relevant anatomy, etiopathogenesis and management are dis-

cussed, and suggestions are made for its prevention.

Anatomy

The pudendal nerve originates in the sacral plexus; it derives its fibers from the ventral rami of the second, third and fourth sacral nerves. It passes between the piriformis muscle and coccygeus (ischiococcygeus) muscles and leaves the pelvis through the lower part of the greater sciatic foramen. It crosses posterior to the ischial spine and reenters the pelvis curving anteriorly and inferiorly through the lesser sciatic foramen. It accompanies the internal pudendal artery and internal pudendal vein upwards and forwards along the lateral wall of the ischiorectal fossa, being contained in a sheath of the obturator fascia termed the pudendal canal (Alcock's canal), along with the internal pudendal blood vessels [1]. The pudendal nerve when it emerges from the pudendal canal branches into the deep perineal nerve and the dorsal nerve of the penis. Sensory inputs are centrally integrated as sensory perceptions and elicit autonomic and somatomotor responses, including perineal floor muscle contraction, through the dorsal nerve of the penis. Conversely, the perineal nerve supplies the largest percentage of scrotum sensation, together with motor branches that innervate part of the levatoris ani muscle, as well as the bulbocavernosus and ischiocavernosus muscles. Thus, the integrity of the perineal nerve is essential to the ischiocavernosus muscle contractions that produce optimal rigidity and maintenance of erection [2].

As a whole, the pudendal nerve is a mixed nerve of critical importance to all aspects of erection that can be readily contused between the perineal post of the fracture table and the bony ridge of the ischial ramus and the dense fascia of the urogenital diaphragm [3, 4].

Incidence

The reported incidence of pudendal nerve injury during orthopedic trauma surgery ranges from 1.9% to 27.6% and is closely associated to the use of traction tables [5, 6]. Mallet et al [7] reviewed 168 patients, with femoral and tibial fractures treated with intramedullary nails on traction tables and found that the incidence of ED was as high as 40.5%. Pudendal nerve

Manuscript accepted for publication March 02, 2017

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doi: <https://doi.org/10.14740/jcs322e>

palsy has been reported as a complication following hip arthroscopy [8].

Etiopathogenesis

Prolonged countertraction on the fracture table and the inappropriate placement of the perineal post, leading to contusion or stretching of the pudendal nerve, are the two main contributing factors of postoperative palsy [5, 9-11].

A relationship was demonstrated between the duration and magnitude of intraoperative traction and the development of pudendal nerve palsy during intramedullary femoral fracture fixation. Rudge et al [12] have shown that continuous pressure of 1.4 kg/cm for 90 min can cause a nerve conduction block, which can be complete and permanent. It has been estimated that the actual traction pressure exerted on the perineal region to be greater than 1.4 kg/cm, placing the perineal nerves involved in the erectile mechanism at considerable risk of injury [10, 13]. The mean operative time in the literature varies between 130 and 240 min and is regarded by some authors as a risk factor [13, 14].

Several studies showed a correlation between the prevalence of pudendal nerve injury and the perineal post diameter [7, 9, 10, 13, 14]. It was always smaller than the average distance separating the two ischial tuberosities in male adults (8 - 10 cm). This can increase the pressure on the bony prominence of the ischial ramus, the precise location of the dorsal nerve of the penis. The highest incidence was reported by Rose et al [14] who used a post of 3.8 cm in diameter.

Insufficient muscle relaxation was also reported to be a contributing factor of pudendal nerve injury. Mallet et al [7] reported that greater intraoperative doses of curare significantly decrease the incidence of postoperative ED, suggesting that postoperative ED could be partially prevented by optimal muscle relaxation during fracture reduction. This is particularly important in young men who have strong femoral muscles and thus require larger traction forces when compared to elderly patients with femur fractures.

Diagnosis Approach

The sensory terminal branches of the pudendal nerve appear more susceptible to injury than do the motor branches which control sexual function. This explains that in 90% of cases, it is a simple contusion (neurapraxis) of the pudendal nerve due to stretching or simple compression. Clinical signs are essentially sensitive, such as hypoesthesia of the perineum, and will amend rapidly in 4 weeks [15]. More rarely it is a severe contusion or crushing of the nerve (neurotmesis) which is accompanied by clinical and electrical signs of denervation. Vesico-sphincter dysfunction, such as urinary incontinence, ED and hypoesthesia or complete anesthesia of scrotum and glans penis are the main clinical manifestations. Functional recovery is longer of the order of 6 months [16, 17].

Perineal electrophysiological examination can confirm the pudendal neuropathy and give prognostic information.

Bulbocavernosus muscle electromyography (EMG), measurements of the bulbocavernosus reflex latencies, somatosensory evoked potentials of the pudendal nerve, sensory conduction velocity of the dorsal nerve of the penis, and pudendal nerve terminal motor latencies were used to objective the pudendal nerve palsy. They should be considered when symptoms are not regressive and in cases of vesico-sphincter dysfunction and immediate severe ED [18].

Treatment and Preventive Measures

No medical treatment has demonstrated its effectiveness. Sildenafil, tadalafil and vardenafil are the phosphodiesterase inhibitors licensed for the treatment of ED. The agents may be stopped after the erectile capacity returns to normal, or to a level where the patient feels it is satisfactory, and this may range from few months in some patients to a longer term in others. Pudendal nerve decompression through para-anal or perineal incision was reported in some cases of stable disorders [16, 19].

Strategies to avoid perineal traction injuries include using a well-padded, large diameter perineal post (□ 10 cm) to distribute traction on the perineum. This should be placed between the genitalia and the atraumatic lower limb in order to keep tilting of the traumatized side of the pelvis to a minimum against the perineal post [13, 20, 21]. The duration of traction time should be minimized; traction should be limited to the critical operative steps only. For example, in the case of intramedullary nail fixation, traction should be used during the reduction manoeuvre, the passage of the guide wire and nail across the fracture site and the placement of the interlocking screws. Traction should be released for the rest of the procedure, in order to reduce the amount and duration of intra-operative traction. When the surgical time exceeds 120 min, the intraoperative traction should be released; periodic release of the traction should, also, be considered [12, 15, 20]. Complete muscle relaxation under anesthesia is essential to reduce muscle tone, which will be advantageous in reducing the force needed during intraoperative traction. This is particularly important in young men who have strong femoral muscles and thus require larger traction forces when compared to elderly patients with femur fractures [7].

Conclusion

ED secondary to pudendal nerve injury after femur orthopedic surgery is common. Surgeons should be aware of the pathogenesis behind the development of this injury and absolute care needs to be taken during operation to avoid it from happening. Iatrogenic ED can have serious medico-legal implications, therefore, patients must be clearly informed about this possible neurological complication before an operation on the orthopedic table.

Conflicts of Interest

The authors have none to declare.

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