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CLINICAL INFORMATION

Foot drop: an iatrogenic complication of spinal anesthesia



Vipin Kumar Goyal*, Vijay Mathur

Mahatma Gandhi Medical College and Hospital, Department of Anesthesiology, Jaipur, India

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KEYWORDS

Spinal anesthesia;
Paresthesia;
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Abstract

Background and objectives: Foot drop in postoperative period is very rare after spinal anesthesia. Early clinical assessment and diagnostic interventions is of prime importance to establish the etiology and to start appropriate management. Close follow-up is warranted in early postoperative period in cases when patient complain paresthesia or pain during needle insertion or drug injection.

Case report: A 22-year-old male was undergone lower limb orthopedic surgery in spinal anesthesia. During shifting from postoperative ward footdrop was suspected during routine assessment of regression of spinal level. Immediately the patient was referred to a neurologist and magnetic resonance imaging was done, which was inconclusive. Conservative management was started and nerve conduction study was done on the 4th postoperative day that confirmed pure motor neuropathy of right peroneal nerve. Patient was discharged with ankle splint and physiotherapy after slight improvement in motor power (2/5).

Conclusions: Foot drop is very rare after spinal anesthesia. Any suspected patient must undergo emergent neurological consultation and magnetic resonance imaging to exclude major finding and need for early surgical intervention.

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PALAVRAS-CHAVE

Anestesia espinal;
Parestesia;
Imagem de
ressonância
magnética;
Fisioterapia

Pé caído: uma complicação iatrogênica da anestesia espinal

Resumo

Justificativa e objetivos: Pé caído no período pós-operatório é muito raro após a anestesia espinal. Avaliação clínica e intervenções diagnósticas precoces são de primordial importância para estabelecer a etiologia e iniciar o tratamento adequado. Um acompanhamento atento é justificado no pós-operatório imediato nos casos em que o paciente se queixa de parestesia ou dor durante a inserção da agulha ou da injeção de fármacos.

* Corresponding author.

E-mail: dr.vipin28@gmail.com (V.K. Goyal).

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Relato de caso: Paciente do sexo masculino, 22 anos de idade, submetido à cirurgia ortopédica de membros inferiores sob anestesia espinal. Durante a transferência para a sala de recuperação pós-operatória, houve suspeita de pé caído durante a avaliação rotineira da regressão do nível espinal. O paciente foi imediatamente encaminhado ao neurologista e uma ressonância magnética foi feita, mas não foi conclusiva. O manejo conservador foi iniciado e o estudo de condução nervosa foi realizado no 4º dia de pós-operatório, o que confirmou a neuropatia motora pura do nervo fibular direito. O paciente foi dispensado com imobilizador de tornozelo e fisioterapia após ligeira melhora da força motora (2/5).

Conclusões: Pé caído é muito raro após a anestesia espinal. Qualquer paciente suspeito deve ser submetido à consulta neurológica de emergência e ressonância magnética para excluir o principal achado e a necessidade de intervenção cirúrgica precoce.

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Introduction

Spinal anesthesia contributes a major part of current anesthesia practice and an anesthetic modality of choice in patients undergoing lower abdominal, gynecological and lower limb surgeries. Although patient safety is very high, still it is not absolutely free of complications. Postoperative neurological deficits, although very uncommon, can be very distracting for both patient and anesthesiologist. These may include paraplegia, hemiplegia, cauda equina syndrome, transient neurologic symptoms, etc.¹⁻⁴ Foot drop is a very rare adverse outcome after spinal anesthesia. Only few cases were reported in previous literature.⁵⁻⁷

Case report

A young male, aged 22 year posted for close reduction and internal fixation with interlock nailing for fracture on distal one third of left tibia following a road traffic accident. On preoperative examination history and physical examination were not suggestive of any previous neurological, muscular and hematologic disease. Patient hemodynamic parameters were normal for his age and routine investigations were in the normal range including coagulation profile. Patient was advised tablets pantoprazole 40 mg and lorazepam 2 mg at night before surgery and 6 AM in morning with sip of water.

On day of surgery, on arrival in operation room, a 18G intravenous (IV) cannula was secured in left hand and ringer lactate was started at rate of 15 mL.kg⁻¹.h⁻¹. Standard anesthesia monitoring including 5 lead electrocardiogram (ECG), pulse oximetry and non-invasive blood pressure (NIBP) were initiated and baseline hemodynamic parameters were noted. Under all aseptic precautions, a 25 G Quincke needle was inserted in the L3-L4 interspace, midline approach in sitting position with bevel facing laterally. As the needle advanced, patient complained for jerk in his right lower limb. Immediately, the needle was slightly withdrawn. On free flow of cerebrospinal fluid, 2.5 mL of 0.5% hyperbaric bupivacaine was injected in subarachnoid space and patient was laid supine. During injection of local

anesthetic patient not complained any pain or paresthesia. At 5 min after drug injection, sensory level was T10 and modified bromage score was 3 and surgeon is informed to start surgery. Intraoperative period was uneventful except single episode of hypotension (blood pressure – 90/46 mmHg) which was easily managed with single dose of intravenous ephedrine. At end of surgery patient was transferred to postoperative care unit with sensory level T12 and motor score 3. After 3 h, patient was planned to shift in orthopedic ward and during routine assessment of motor and sensory level by caring anesthetist patient found to be unable to dorsiflex his right foot. At this point sensory level was S1 while bromage score was 0 in both limbs.

Neurologist was consulted, who diagnosed this case as right-sided foot drop with complete loss of ankle dorsiflexion (1/5). Deep tendon reflexes were normal (2+) in both lower limbs. Emergent magnetic resonance imaging was done, which was inconclusive for clinical findings, with no evidence of a hematoma. Patient was kept under neurologist observation for early detection of progression of symptoms where he was treated with intravenous steroid, oral analgesics and multivitamin along with intense physiotherapy.

On 4th postoperative day nerve conduction study was done which showed pure motor neuropathy of right peroneal nerve (Tables 1-3). After confirmation of nonprogressive nature of symptoms and slight improvement in motor power (2/5), patient was discharged on the 8th postoperative day with ankle splint and advice of regular physiotherapy. During follow-up at one month, on examination, there was further improvement in motor power (3/5 ankle dorsiflexion). The patient was advised to continue with the physiotherapy and ankle support.

Discussion

Foot drop is defined as patient inability to dorsiflex the foot. Foot drop in perioperative period has multiple etiologies like sciatic or peroneal (common or deep) nerve injury, lumbosacral root trauma or compression, etc. Probability of sciatic and peroneal nerve injury is more obvious in

Table 1 Motor nerve studies: lower limb.

Nerve	Site	Latency 1 (ms)	Duration (ms)	Amplitude (mV)	Nerve conduction velocity (m·s ⁻¹)
Right peroneal nerve	Ankle	2.50	8.13	0.7	45.45
	Knee	10.42	7.60	0.5	
Right tibial	Ankle	2.71	10.00	18.4	45.76
	Knee	11.67	13.13	10.7	

Motor nerve study showing: 1. Right peroneal nerve is non-recordable; 2. Normal distal latency, normal amplitude and normal conduction velocity in right tibial nerve.

Table 2 Sensory nerve studies: lower limb.

Nerve	Site	Latency 1 (ms)	Duration (ms)	Amplitude (μV)	Nerve conduction velocity (m·s ⁻¹)
Superficial peroneal	Lateral malleolus	2.21	1.04	10.8	58.82
Sural	Mid calf	3.08	0.56	24.7	42.21

Sensory nerve study showing: 1. Normal peak latency, normal amplitude and normal conduction velocity in right superficial peroneal and sural nerves.

Table 3 F-wave studies: lower limb.

Nerve	Fmin latency (ms)	Fmax latency (ms)	Fmean latency (ms)
Right peroneal	2.9	2.9	2.9
Right tibial	54.8	54.8	54.8

F-wave study shows: 1. Right peroneal nerve is non-recordable; 2. Normal F-wave latency in right tibial nerve.

surgeries performed in lithotomy position viz. transurethral resection of prostate, anorectal surgery or gynecological procedures.⁸⁻¹⁰ Injury to common peroneal nerve is more common due to its superficial course and easy compression against fibular head. Improper positioning, inadequate padding and long surgical duration are predisposing factors associated with compressive neuropathy.

Neurological complications after spinal anesthesia are very uncommon. Predisposing factors are probably direct injury to nerve by needle, accidental injection of drug in nerve or compression of nerve by hematoma.^{11,12} Pain or paresthesia during procedure can alert anesthesiologist for possibility of needle trauma or accidental injection of drug in nerve root. Patient's complain must be taken seriously and slight withdrawal of needle is advised before injection of local anesthetic. Incidence of spinal hematoma is very low, still needs consideration as a causative factor for early postoperative foot drop. Spinal cord or nerve root compression by hematoma is the pathophysiology.

Close follow-up and clinical examination is needed to establish early diagnosis of postoperative foot drop in susceptible patients. Magnetic resonance imaging (MRI) should be done to confirm detectable spinal injury while nerve conduction study and electromyography to establish its neurological or muscular origin respectively. MRI is done on urgent basis on clinical suspension while electrodiagnostic studies done 3 weeks after acute injury.^{13,14} Electrodiagnostic studies should be done within first five days of injury in medicolegal cases. Management of foot drop is depends on its etiology. Early surgical decompression of hematoma is needed in spinal or epidural hematoma while peripheral

neuropathy mandates conservative management with ankle splint, physiotherapy and regular follow-up.

Conclusion

Patients with complain of pain or paresthesia during spinal anesthesia must be carefully watched in postoperative period and early diagnosis and management is warranted to prevent any permanent sequel.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Scott DB, Tunstall ME. Serious complications associated with epidural/spinal blockade in obstetrics: a two-year prospective study. *Int J Obstet Anesth.* 1995;4:133-9.
2. Auroy Y, Benhamou D, Bagues L, et al. Major complications of regional anesthesia in France. *Anaesthesiology.* 2002;97:1274-80.
3. Kane RE. Neurologic deficits following epidural or spinal anesthesia. *Anesth Analg.* 1981;60:150-61.
4. Selander D, Dhuner KG, Lundborg G. Peripheral nerve injury due to injection needles used for regional anaesthesia. An experimental study of the acute effects of needle point trauma. *Acta Anaesthesiol Scand.* 1997;21:182-8.
5. Nirmala BC, Kumari G. Foot drop after spinal anaesthesia: a rare complication. *Indian J Anaesth.* 2011;55:78-9.

6. Ghai A, Hooda S, Kumar P, et al. Bilateral foot drop following lower limb orthopedic surgery under spinal anesthesia. *Can J Anesth.* 2005;52:550.
7. Ahmad FU, Pandey P, Sharma BS, et al. Foot drop after spinal anesthesia in a patient with a low-lying cord. *Int J Obstet Anesth.* 2006;15:233–6.
8. Warner MA, Martin JT, Schroeder DR, et al. Lower-extremity motor neuropathy associated with surgery performed on patients in a lithotomy position. *Anesthesiology.* 1994;81:6–12.
9. Sahai-Srivastava S, Amezcua L. Compressive neuropathies complicating normal childbirth: case report and literature review. *Birth.* 2007;34:173–5.
10. Radawski MM, Strakowski JA, Johnson EW. Acute common peroneal neuropathy due to hand positioning in normal labor and delivery. *Obstet Gynecol.* 2011;118:421–3.
11. Symons JA, Palmer GM. Neuropathic pain and foot drop related to nerve injury after short duration surgery and caudal analgesia. *Clin J Pain.* 2008;24:647–9.
12. Waldron JS, Oh MC, Chou D. Lumbar subdural hematoma from intracranial subarachnoid hemorrhage presenting with bilateral foot drop: case report. *Neurosurgery.* 2011;68:835–9.
13. Oh SJ. Electromyographic studies in peripheral nerve injuries. *South Med J.* 1976;69:177–82.
14. Campbell WW. Evaluation and management of peripheral nerve injury. *Clin Neurophysiol.* 2008;119:1951–65.