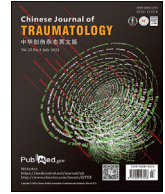




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Original Article

Preventable iatrogenic cause of foot-drop in knee injuries with literature review

Anant Krishna ^a, Sumit Arora ^{b, *}, Rakesh Goyal ^b, Manish Kumar ^b, Nirup Naik ^b, Manoj Kumar ^b^a Department of Orthopaedics, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, 110029, India^b Department of Orthopaedic Surgery, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi, 110002, India

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ABSTRACT

Purpose: Common peroneal nerve palsy is quite disabling and every effort should be made to prevent its injury during the treatment.**Methods:** We retrospectively reviewed the prospectively collected data of 7 cases of tibial plateau fractures in association with proximal fibula fracture from January 2019 to September 2019 who presented to emergency room of our hospital.**Results:** In addition to fibular neck fracture, the first case had type 6 tibial plateau displaced fracture and the second case had displaced acetabular fracture with instability of knee with tibial tuberosity avulsion. common peroneal nerve palsy developed following application of distal tibial skeletal traction in both the cases. Other 6 such cases remained neurologically intact as traction was not applied to them.**Conclusion:** Such iatrogenic complication could have been prevented if the injury pattern of "concomitant medial and lateral columns" of the proximal leg is kept in mind by the treating surgeon before applying skeletal traction.© 2021 Chinese Medical Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Common peroneal nerve (CPN) palsy is one of the most common nerve palsies of the lower extremity. It results in the weakness of ankle and toe dorsiflexors (foot-drop) and sensory loss over dorsum of the foot and/or the first web space. It is reported to happen in 16%–40% of the multi-ligamentous knee injury cases and 25%–40% of the knee dislocation cases.^{1–5} As CPN is relatively fixed at the neck of fibula, the nerve may suffer tractional injury when varus and hyperextension forces are applied to the knee. Deep peroneal component is likely to be injured following knee dislocation as it is located between tibialis anterior and extensor digitorum longus close to the interosseous membrane.⁵

It is thus clear that CPN palsy associated with multi-ligamentous knee injuries or knee dislocations has been described in the literature. However, the phenomenon of CPN palsy after distal tibial pin traction has not been previously described in the literature to the best of authors' knowledge. We suggest that the CPN is at risk if skeletal traction is applied in the presence of bony or ligamentous discontinuity in both the medial (tibial) and the lateral (fibular)

'columns' simultaneously. A proper knowledge of such type of injury pattern can help an orthopaedic surgeon from committing such a disastrous, yet preventable iatrogenic CPN palsy.

With the present report, the authors wish to sensitize the readers about osteo-ligamentous injury pattern of 'concomitant medial and lateral columns' of the proximal leg which put the CPN vulnerable to traction injury and suggest that the presence of fibular neck fracture should be placed as a separate subgroup of the existing proximal tibia fracture classification.

Methods

We retrospectively reviewed the prospectively collected data of 7 cases of tibial plateau fractures/unstable knee in association with proximal fibula fracture/ lateral ligament injury from January 2019 to September 2019 (out of total 53 patients with tibial plateau fractures) who presented to emergency room of our hospital which is a tertiary care teaching referral hospital. Written informed consent was obtained from all the patients authorising treatment, radiological and photographic documentation. They were also informed that data concerning the case might be submitted for publication and they consented. Institutional ethical clearance was obtained. The case details are as follows.

* Corresponding author.

E-mail address: mamc_309@yahoo.co.in (S. Arora).

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Case 1

A 20-year-old man presented to the emergency room of our tertiary care-teaching-referral hospital with a history of fall from the stairs. He complains of pain and swelling of the right proximal leg with inability to bear weight. On physical examination, he had gross swelling, tenderness, and deep abrasion over anterior aspect of proximal leg. There was no distal neurovascular deficit. Injury to any other organ system was ruled out. Radiographs revealed Schatzker's type 6 tibial plateau fracture⁶ with fibular neck fracture (Fig. 1). Multidetector CT was obtained with reconstruction in axial, coronal, and sagittal planes to study the fracture anatomy. Since the soft-tissue envelope was not conducive for internal fixation (Fig. 2), we applied distal tibial skeletal traction (with 5 kg weight) to improve soft tissue condition pending definitive surgery.

On the next morning, he complained of difficulty in dorsiflexion of the ankle and toes with tingling over dorsum of the foot. On examination, the tibialis anterior, extensor hallucis longus, extensor digitorum had no power with the Medical Research Council grade 0 and 70%–80% hypoesthesia over dorsum of the foot especially over the 1st web space. Traction pin was removed and the limb was placed in well-padded above-the-knee plaster slab. Proximal tibia fracture was stabilized with Ilizarov's ring fixator (Fig. 3). He was prescribed ankle foot orthosis (AFO) to prevent equinus contracture. At 7 months follow-up, CPN palsy is still persisting.

Case 2

A 38-year-old man presented to emergency room with a history of road traffic accident. He complains of pain in his right hip and knee, and inability to bear weight. On physical examination, he had stable vitals. There was gross swelling and tenderness of the hip and knee. Knee was unstable in sagittal plane and on valgus stress. There was no distal neurovascular deficit. He also had sustained head injury. He was diagnosed to have central fracture-dislocation of the acetabulum with ipsilateral avulsion fracture of the tibial tuberosity and tibial spine with multi-ligament knee injuries and fracture of the fibular neck (Fig. 4).



Fig. 2. Clinical photograph of the patient shows poor skin condition, deep abrasion, blistering and peeling.

He was given skeletal traction through distal tibial pin. Few hours later, he reported paresthesia on the dorsum of the foot and the lateral aspect of the leg and weakness of the dorsiflexion of the foot. On examination, the tibialis anterior, extensor hallucis longus, extensor digitorum had only flickers of movements (Medical Research Council grade 1) and 60%–70% hypoesthesia over dorsum of the foot especially over the 1st web space. It was realized that skeleton traction must have caused stretch injury to CPN as there was multi-ligamentous knee injury associated with fibular neck fracture; thus, both "the medial and lateral columns" were injured. Distal tibial pin was removed and distal femoral pin was inserted for acetabular injury pending operative fixation. He was started on tablet methylcobalamine of 1500 µg orally once a day and above-the-knee plaster slab was given. He was taken up for operative stabilization of acetabulum fracture the next day after taking neuro-surgical clearance. Combined spinal epidural anaesthesia was given and he was positioned in the lateral decubitus



Fig. 1. Anteroposterior and lateral view radiographs of a 20-year-old patient shows type 6 tibial plateau fracture with fibular neck fracture.

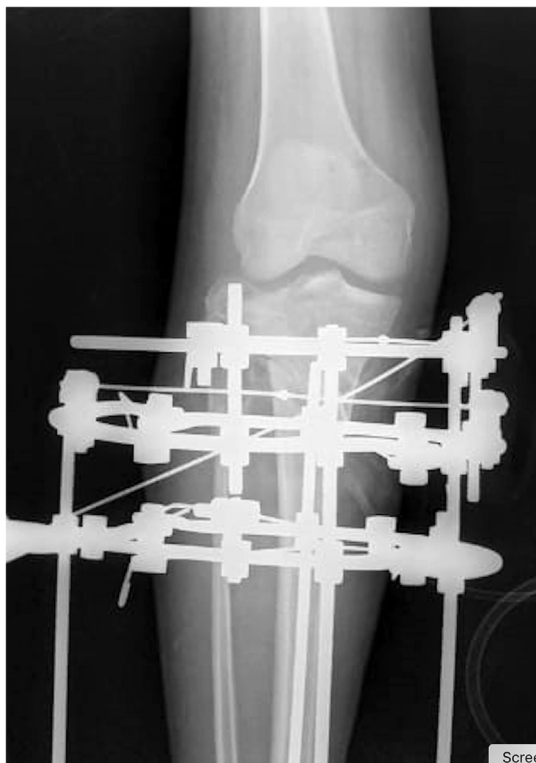


Fig. 3. Postoperative anteroposterior radiograph shows Ilizarov's frame application on the leg.

position. Soon after that, he had severe hypotension with difficulty in breathing and maintaining his saturation secondary to possible anaphylaxis. The surgery was postponed and patient was shifted to intensive care unit after clinical stabilization. He was again taken up in theatre after 18 days. Open reduction and internal fixation with reconstruction plate was done for the posterior wall and column using Kocher-Langenbeck approach with trochanteric flip osteotomy. Intraoperative knee range of motion from extension to flexion was checked under fluoroscopy. Since fracture fragments around the knee were found not moving with the knee movements, it was decided to treat knee bony injuries non-operatively pending subsequent clinical evaluation. Postoperatively, the skeletal traction was continued through distal femoral pin and AFO was prescribed. He was reluctant about diagnostic work-up or arthroscopic intervention of the knee during his out-patient clinic visits. CPN injury was persisting at 6 months follow-up.

Cases 3 and 4

A 25-year (Fig. 5) and 28-year-old men presented with Schatzker's type 6 tibial plateau fracture⁶ in association with fibular neck fractures following road traffic accident. There was no distal neurovascular deficit in either of the cases. The soft tissue envelope over the knee and proximal leg was compromised with gross swelling, deep abrasions, and internal degloving. In the light of the experience with the above described cases, we were apprehensive in applying traction till definitive fixation is planned. Hence, we put the patients on padded above-the-knee slab with limb elevation over pillows. The slab was slit open anteriorly to keep a watch on the soft tissues. They were encouraged to move the toes and started on anti-inflammatory medicines to decrease the swelling. They were operated upon with ilizarov ring fixator after 3–4 days. Both

of them remained neurologically intact till last follow-up at 4–5 months.

Cases 5, 6 and 7

We present similar 22-year (Fig. 6), 31-year, and 42-year-old men with Schatzker's type 6 tibial plateau fracture⁶ in association with fibular neck fractures following road traffic accident. There was no distal neurovascular deficit in either of the cases. The soft tissue envelope over the knee and proximal leg was reasonably normal except for some swelling. They were planned for early internal fixation with plating after 5–6 days. Since we were wiser with our previous experience, we put these cases on padded above-the-knee slab with limb elevation over pillows. The slab was slit open anteriorly to keep a watch on the soft tissues. They were encouraged to move the toes and started on anti-inflammatory medicines to decrease the swelling before definitive surgery. Open reduction (2 cases, Fig. 7) and minimally invasive (1 case) internal fixation with locking plates were achieved. All of them remained neurologically intact till last follow-up at 3–5 months.

Results

In addition to fibular neck fracture, the first case had type 6 tibial plateau displaced fracture and the second case had displaced acetabular fracture with avulsion fractures of the tibial spine and the tibial tuberosity with multi-ligament knee injury. CPN palsy developed following application of distal tibial skeletal traction in both the cases, which was persisting even after 6–7 months of follow-up. The rest of the cases remained neurologically intact as traction was not applied to them. The details are mentioned in Table 1.

Discussion

Traumatic CPN palsy has been described in the literature in association with multi-ligamentous injury to the knee and knee dislocation.^{1–5} But CPN palsy following distal tibia skeletal traction for "combined medial and lateral osteo-ligamentous column" injury of the proximal leg has not been described in the literature to the best of authors' knowledge. Transmission of traction forces directly to the CPN in the presence of concomitant bony and/or soft tissue breach in the continuity of the osteo-ligamentous "medial and lateral columns" of the proximal leg may be considered to be a plausible cause of CPN palsy in our first 2 cases. However, it may be clearly understood that the traction injury to CPN in the present context is not a function of the site of traction, and the risk of traction injury to CPN in the present scenario would not have been any less, had the traction been applied through the calcaneum.

With a view to sensitize the practicing orthopaedic surgeons to this preventable cause of CPN palsy, a classification of injury pattern is proposed based on the anatomical concept that there exist 2 osteo-ligamentous columns in proximal part of the leg (Fig. 8). The lateral osteo-ligamentous column is comprised of head/neck of the fibula and lateral collateral ligament (LCL) including posterolateral corner (PLC); and medial osteo-ligamentous column is comprised of medial collateral ligament (MCL), tibial plateau (including tibial spine), cruciate ligaments, and rupture or avulsion of the ligamentum patellae. We have considered these osteo-ligamentous structures (Fig. 8A) more important than anterior (quadriceps mechanism) and posterior (hamstrings and biceps) musculotendinous structures as the presence of red muscle fibres allow them to change their length under external deforming forces (Fig. 8B). We propose 3 types of osteo-ligamentous disruptions: type 1 injury involves bony structures



Fig. 4. Anteroposterior and lateral view radiographs of a 38-year-old patient shows type 6 tibial plateau fracture with fibular neck fracture. He also had ipsilateral acetabulum fracture.



Fig. 5. Anteroposterior and lateral view radiographs of a 25-year-old patient shows type 6 tibial plateau fracture with fibular head fracture.

in both lateral as well as medial columns (head/neck of fibula fracture and Schatzker's type 6 tibial plateau fracture) (Fig. 9A); type 2A involves bony injury in the lateral column and ligamentous injury in the medial column (head/neck of fibula fracture and MCL and cruciate ligaments injury or avulsion of tibial spines including rupture or avulsion of the ligamentum patellae) (Fig. 9B); type 2B

involves ligamentous injury in the lateral column and bony injury in the medial column (LCL/PLC injury and Schatzker's type 6 tibial plateau fracture) (Fig. 9C); whereas type 3 involves only ligamentous structures in both lateral as well as medial columns (LCL/PLC injury with MCL and cruciate ligaments injury including rupture or avulsion of the ligamentum patellae) (Fig. 9D). Our case number 2



Fig. 6. Anteroposterior and lateral view radiographs of a 22-year-old patient shows type 6 tibial plateau fracture with fibular head fracture.

may be considered as type 2A injury, and the rest all cases may be classified under type 1 injury pattern. Although types 2B and 3 pattern have not been observed in our series, it is hoped that the surgeons at our as well as other countries may pick up these injury patterns. However, given a high incidence of CPN palsy (16%–40%) in cases of multi-ligament knee injuries,^{1,2} it would be a fair speculation that if reviewed critically, a large segment of those patients would belong to type 3 of authors' classification. The purpose of this proposed classification is to prepare the readers to be wary of such injury patterns to guard against any potential risk to CPN.

Our first case had Schatzker's type 6 tibial plateau fracture⁶ along with displaced fracture of the fibular neck without neural/vascular deficit at the time of presentation. He was applied distal tibial skeletal traction in view of the bad skin condition of the proximal leg. Soon after, he developed CPN palsy. Skeletal traction is often required in the management of tibial plateau fractures in the emergency room pending operative fixation in busy tertiary care hospital especially when the skin condition precludes immediate internal fixation. The classification proposed by Schatzker et al.⁶ is the most widely used system where they classified tibial plateau fractures into 6 types. Type 6 represents the most severe form which involves dissociation of the metaphysis and diaphysis. Our case had fibular neck fracture in addition to type 6 tibial plateau fracture. Such a fracture pattern may put CPN at risk as soon as skeletal traction is applied because bony continuity of 'the medial and lateral osteo-ligamentous columns' of the proximal leg is damaged and all the traction force will now be borne by neurovascular structures, and soft tissue envelope. Traction in such situation will be more detrimental for CPN rather than tibial nerve as it is superficial in course and is rendered relatively immobile at the fibular neck.^{3–5}

Our second case had central fracture-dislocation of the acetabulum with ipsilateral avulsion fracture of the tibial tuberosity, tibial spine with multi-ligament knee injury associated with displaced fracture of the fibular neck without neural/vascular deficit at the



Fig. 7. Intra-operative image intensifier picture of the patient shows locking plate fixation.

time of presentation. Kempegowda et al.⁷ showed that 15% of the patients with acetabular fractures have associated knee injury.

Table 1
Case-details of all the patients in our series.

Case No.	Age/ Sex	Mechanism of injury	Type of fracture	Type of OLC injury pattern	Imaging modality	Fixation modality	Results
1.	20/ M	High energy trauma (RTA)	Schatzker's type 6 tibial plateau fracture with fibular neck fracture	Type 1	X-rays and NCCT	Initial distal tibia skeletal traction followed by Ilizarov's fixator	Knee function was good, but CPN palsy persisting after 7 months
2.	38/ M	High energy trauma (RTA)	Avulsion fracture of tibial tuberosity, tibial spine with multi-ligament knee injury and fracture fibular neck in addition to ipsilateral central fracture-dislocation of the acetabulum	Type 2A	X-rays and NCCT	Initial distal tibial skeletal traction followed by ORIF of acetabulum and distal femoral pin traction. Knee injury treated non-operatively	Knee function was good, but CPN palsy persisting after 6 months
3.	25/ M	High energy trauma (RTA)	Schatzker's type 6 tibial plateau fracture with fibular neck fractures	Type 1	X-rays and NCCT	Plaster slab followed by Ilizarov's fixator	Knee function was good
4.	28/ M	High energy trauma (RTA)	Schatzker's type 6 tibial plateau fracture with fibular neck fractures	Type 1	X-rays and NCCT	Plaster slab followed by Ilizarov's fixator	Knee function was good
5.	22/ M	High energy trauma (RTA)	Schatzker's type 6 tibial plateau fracture with fibular neck fractures	Type 1	X-rays and NCCT	Plaster slab followed by ORIF of proximal tibia fractures with locking plate	Knee function was good
6.	31/ M	High energy trauma (RTA)	Schatzker's type 6 tibial plateau fracture with fibular neck fractures	Type 1	X-rays and NCCT	Plaster slab followed by ORIF of proximal tibia fractures with locking plate	Knee function was good
7.	42/ M	High energy trauma (RTA)	Schatzker's type 6 tibial plateau fracture with fibular neck fractures	Type 1	X-rays and NCCT	Plaster slab followed by ORIF of proximal tibia fractures with locking plate	Knee function was good

RTA: road traffic accident; NCCT: non-contrast computed tomography; OLC: osteo ligamentous column; ORIF: open reduction & internal fixation; CPN: common peroneal nerve.

Schmidt et al.⁸ reported that knee injury may be associated in 78% of the cases with acetabular fracture dislocation. Skeletal traction is often required in these cases in emergency room to keep femoral head away from displaced acetabular fragments pending operative fixation and such traction maybe needed after fixation too.^{9,10} We applied distal tibial pin traction in our patient and soon after that

he developed CPN palsy. CPN palsy is reported to be associated with 16%–40% of the cases of multi-ligament knee injury at the time of presentation.^{1,2} Tibial nerve is generally spared or less severely injured in multi-ligament injured knee or dislocation cases as it lies deep in the posterior compartment and is relatively mobile in sharp contrast to CPN.^{3–5}

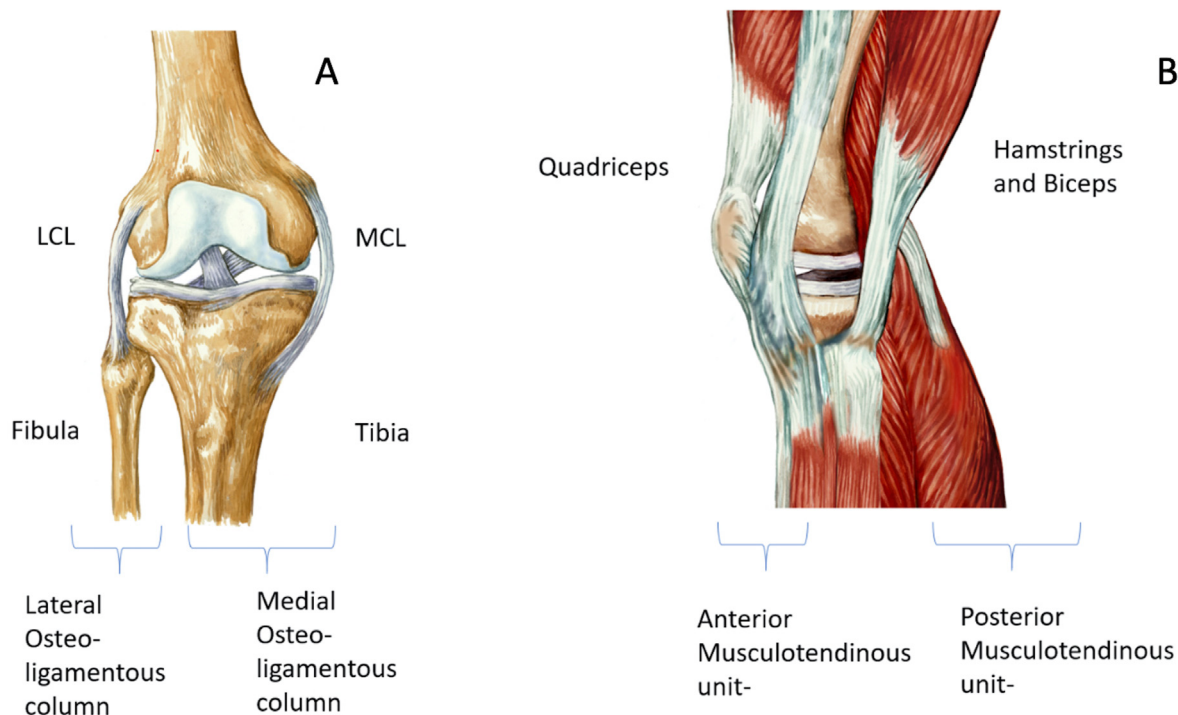


Fig. 8. (A) Medial and lateral osteo-ligamentous columns are more important in knee stability than (B) anterior (quadriceps mechanism) and posterior (hamstrings and biceps) musculotendinous structures as the presence of red muscle fibers allow them to change their length under external deforming forces.

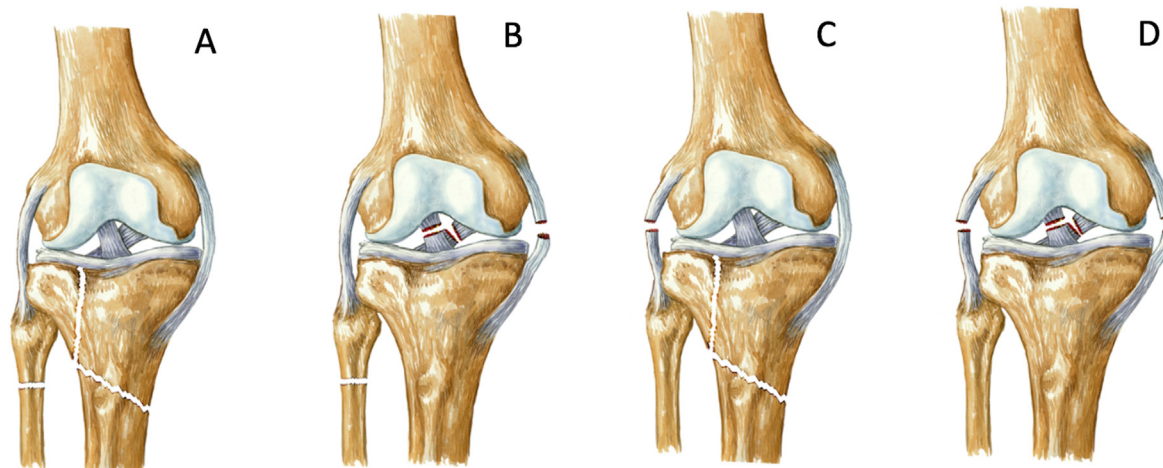


Fig. 9. Proposed classification system based on the anatomical concept that there exist 2 osteo-ligamentous columns in proximal part of the leg: (A) type 1, (B) type 2A, (C) type 2B, (D) type 3 injury pattern.

With these adverse outcomes, we decided not to apply skeletal traction in cases of "concomitant medial and lateral osteo-ligamentous column" injuries of the proximal leg. With this understanding, no CPN palsy developed in next 5 cases. Thus, it is clear from the discussion that intact lateral collateral ligaments and proximal fibula provide protection to CPN against the traction injury. So in case of injury to these structures, traction given through tibial skeletal pin may stretch CPN to its threshold and lead to its palsy. Mihalko et al.¹¹ reported 2 cases of lateral collateral ligament injuries who developed iatrogenic CPN palsy as traction splint was placed in emergency room for the suspicion of distal femur fracture. They advised against applying traction splints for the patients suspected to have injury to lateral stabilizing structures of the knee. Liporace et al.¹² reported a case of CPN palsy in a morbidly obese patient who sustained comminuted distal femoral fracture and was applied with skeletal traction. Histological compromise of nerve occurs if the nerve is stretched beyond 4%–11% in length.¹³ Continuous traction may cause narrowing of the intraneural and extraneural microvasculature leading to ischemic permanent damage to nerve.¹⁴ Zheng et al.¹⁵ recently introduced a classification system for proximal fibula fractures and found an incidence of fibular fracture in 29.88% cases of tibial plateau fractures. They also highlighted the importance of the intact fibular head for the postero-lateral corner stability of the knee and believed that reduction of the fibular fracture helps in minimally invasive fixation of tibial plateau fractures. Given the fact that almost one third of tibial plateau fractures are associated with fracture of the proximal fibula,¹⁵ it becomes imperative that trauma surgeons are sensitized to the classification of the injury patterns as described in this communication as it brings into sharp focus on the risk to CPN in Schatzker type 6 fractures which are associated with fracture of the proximal fibula.

Treatment of CPN palsy aims at promoting recovery with minimal residual deficit. The prognosis depends on patient's age, time since injury, energy of trauma, and associated osseous or vascular injury. Tractional injuries may be treated with non-operative methods using AFO and passive exercises to prevent equinus contracture. Surgical intervention may be required in the form of neurolysis, nerve repair, or tibialis posterior tendon transfer depending on case to case basis.¹⁶ In the cases presented here, the first case was treated with removal of traction and the second case was treated by shifting the traction to distal femur which was

followed by AFO and passive mobilization. After 6–7 months of follow-up, the recovery is yet to happen.

An orthopaedic surgeon should be aware of the 'concomitant medial and lateral osteo-ligamentous column' injury patterns of the proximal leg and use this classification as an adjunct to Schatzker's classification of tibial plateau fractures (particularly type 6 fractures) to save the CPN from a preventable cause of palsy.

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Ethical statement

Each author certifies that the work and all investigations were conducted in conformity with ethical principles of research. Each author believes that the manuscript represents honest work.

Declaration of competing interest

The manuscript has been read and approved by all the authors and requirement for authorship of this document has been met.

Author contributions

All the authors (Anant Krishna, Sumit Arora, Rakesh Goyal, Manish Kumar, Nirup Naik, Manoj Kumar) made significant contribution in the conception of the study, data collection, analysis, writing the draft manuscript and approval of final content of the article.

References

- Mook WR, Ligh CA, Moorman III CT, et al. Nerve injury complicating multi-ligament knee injury: current concepts and treatment algorithm. *J Am Acad Orthop Surg.* 2013;21:343–354. <https://doi.org/10.5435/JAAOS-21-06-343>.
- LaPrade RF. Complications associated with posterolateral knee injuries. In: LaPrade RF, ed. *Posterolateral Knee Injuries: Anatomy, Evaluation and Treatment.* New York, NY: Thieme; 2006:214–226, 97815889003037.
- Gruber H, Peer S, Meirer R, et al. Peroneal nerve palsy associated with knee luxation: evaluation by sonography. Initial experiences. *Am J Roentgenol.* 2005;185:1119–1125. <https://doi.org/10.2214/AJR.04.1050>.

4. Johnson ME, Foster L, DeLee JC. Neurologic and vascular injuries associated with knee ligament injuries. *Am J Sports Med.* 2008;36:2448–2462. <https://doi.org/10.1177/0363546508325669>.
5. Reddy CG, Amrami KK, Howe BM, et al. Combined common peroneal and tibial nerve injury after knee dislocation: one injury or two? An MRI-clinical correlation. *Neurosurg Focus.* 2015;39:E8. <https://doi.org/10.3171/2015.6.FOCUS15125>.
6. Schatzker J, McBroom R, Bruce D. The tibial plateau fracture. The Toronto experience. *Clin Orthop Relat Res.* 1979;138:94–104, 1968–1975.
7. Kempegowda H, Maniar HH, Tawari AA, et al. Knee injury associated with acetabular fractures: a multicenter study of 1273 patients. *J Orthop Trauma.* 2016;30:48–51. <https://doi.org/10.1097/BOT.0000000000000425>.
8. Schmidt GL, Sciulli R, Altman GT. Knee injury in patients experiencing a high-energy traumatic ipsilateral hip dislocation. *J Bone Joint Surg Am.* 2005;87:1200–1204. <https://doi.org/10.2106/JBJS.D.02306>.
9. Dhaniwala NS, Dhaniwala MN. Conservative management of acetabular fractures- case reports. *MOJ OrthopRheumatol.* 2018;10:329–331. <https://doi.org/10.15406/mojor.2018.10.00422>.
10. Magu NK, Rohilla R, Arora S. Conservatively treated acetabular fractures: a retrospective analysis. *Indian J Orthop.* 2012;46:36–45. <https://doi.org/10.4103/0019-5413.91633>.
11. Mihalko WM, Rohrbacher B, McGrath B. Transitional peroneal nerve palsies from injuries placed in traction splints. *Am J Emerg Med.* 1999;17:160–162. [https://doi.org/10.1016/s0735-6757\(99\)90052-9](https://doi.org/10.1016/s0735-6757(99)90052-9).
12. Liporace FA, Yoon RS, Kesani AK. Transient common peroneal nerve palsy following skeletal tibial traction in a morbidly obese patient- case report of a preventable complication. *Patient Saf Surg.* 2012;6:4. <https://doi.org/10.1186/1754-9493-6-4>.
13. Higher WB, Sanders FK. The effects of stretching nerves after suture. *Br J Surg.* 1943;30:355–369.
14. Lundborg G, Rydevik B. Effects of stretching the tibial nerve of the rabbit. A preliminary study of the intraneural circulation and the barrier function of the perineurium. *J Bone Joint Surg Br.* 1973;55:390–401. <https://doi.org/10.1302/0301-620X.55B2.390>.
15. Zheng Z, Yu Y, Chang H, et al. Establishment of classification of tibial plateau fracture associated with proximal fibular fracture. *Orthop Surg.* 2019;11:97–101. <https://doi.org/10.1111/os.12424>.
16. Kouri A, Hamilton R, Skie M. A case report on deep peroneal nerve palsy following patella dislocation. *Open Access Lib J.* 2017;4, e3563. <https://doi.org/10.4236/oalib.1103563>.