CASE REPORT

A Rare Case of Flexor tendon Entrapment and Rupture in Proximal Phalangeal Fracture

Muhammad Sheraz Raza , David Meng Kiat Tan

Abstract:

Introduction: Flexion and extension dysfunction after phalangeal fractures is not very uncommon whether they are treated conservatively by splints or by open reduction internal fixation. But this dysfunction is mostly due to tendon adhesions and digit length shortening. There is a very rare incidence of the flexion dysfunction post phalangeal fracture due to entrapment and rupture of flexor tendon in fracture site especially in adults. To our knowledge there has not been a case reported in which there was flexor tendon rupture secondary to entrapment in phalangeal fracture.

Design: Case Report

Place: Department of Hand and Reconstructive Microsurgery, National University Hospital, Singapore.

Case Report: This is case report is of a 19 years old manual worker who sustained multiple phalageal fractures including a closed fracture of his left index finger proximal phalanx, when his hand was crushed in a printing machine. There was a missed diagnosis of entrapment of his flexor digitorum profundus tendon in the fracture which resulted in flexion dysfunction.

Conclusion: Entrapment and rupture of flexor tendon in a phalangeal fracture is a possibility and it should be kept in mind when managing a patient complaining of some flexion deficit associated with fracture.

Key Words: *Flexion dysfunction, tendon entrapment, tendon rupture, phalangeal fracture.*

Introduction:

Flexion and extension dysfunction after phalangeal fractures is not very uncommon whether they are treated conservatively by splints or by open reduction internal fixation. But this dysfunction is mostly due to tendon adhesions and digit length shortening. There is a very rare incidence of the flexion dysfunction post phalangeal fracture due to entrapment and rupture of flexor tendon in fracture site especially in adults. Only a counted number of cases have been reported for this condition and most of them in pediatric age group. A juxta -epiphyseal proximal phalanx fracture with flexor digitorum profundus entrapment in an 11years old child without rupture. Also reported a similar flexor tendon entrapment in a phalangeal epiphyseal fracture in a 12 years old child with no rupture. In adult such flexor tendon entrapment in phalangeal fractures is very rare and to our knowledge there has not been a case reported in which there was flexor tendon rupture secondary to entrapment in phalangeal fracture. Macknin and Malone[3] reported tendon rupture in a 58 years old patient with proximal phalangeal fracture but there was no evidence of entrapment. Due to the rare nature of this condition, the diagnosis can be missed. An astute clinical examination is usually enough to diagnose this condition but can be supplemented by MRI for accurate diagnosis. There have also been case reports

Mr. Muhammad Sheraz Raza
MBBS, MRCS Edin., FCPS Plast
Corresponding Author
Jinnah Burn and Reconstructive Surgery Centre, Lahore.
Ex-Clinical Fellow Hand and Reconstructive Microsurgery
Department, National University Hospital, Singapore.
E-mail: doc.sheraz007@gmail.com
Cell: +923004214924

about the diagnosis of this type flexor tendon entrapment in phalangeal fractures on X-ray (Jones and Schenck)[4] and also on Ultrasound (Tarun and Salwa)[5] examinations.

Case Report:

The patient, a healthy 19 years old Chinese gentleman, right hand dominant, works in a printing press. He sustained an injury to his left hand when his hand was crushed in the printing machine. He sustained closed fractures in left Index finger proximal and distal phalanges, left middle finger middle and distal phalanges and ring finger distal phalanx. The fracture of index finger proximal phalanx was longitudinal oblique while middle finger middle phalanx head fracture was transverse intra-articular. The fractures in distal phalanges of index, middle and ring finger were all tuft fractures. The patient was operated electively after 12 days of initial injury when open reduction and internal fixation of index finger proximal phalanx and middle finger middle phalanx was achieved. The index finger proximal phalanx fracture was fixed with three compression screws through dorsal approach, while the middle finger middle phalanx head fracture with two cross kirshner wires. Post operatively patient was subjected to early physiotherapy. Patient complained during follow-up period that he has not been able to flex his distal inter-phalangeal joint of index finger since injury. He claimed that he did not mention this before because he thought that it was due to the fracture. The fixed fractures radiologically showed good signs of healing, so middle finger k-wires were removed after six weeks. On a more detailed examination the passive range of motion of DIPJ was found to be more than active range and so a clinical diagnosis was made of the flexor digitorum profundus rupture Fig.1.

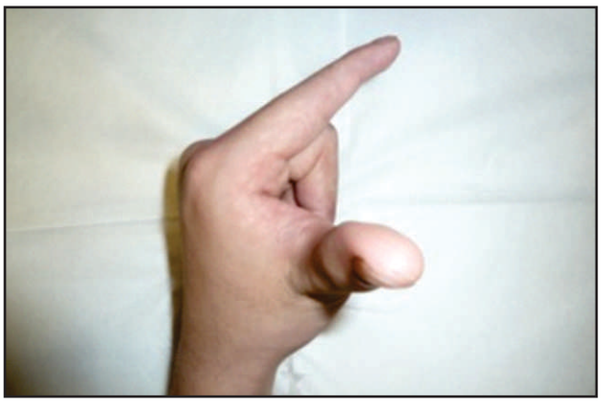

Fig. 1. Inability to flex Index finger

The diagnosis was confirmed by ultrasound, which showed full-thickness short segment tear at the mid proximal phalanx level. The patient was operated almost eleven week after initial injury with plan for tenolysis and possible staged reconstruction of FDP with silastic rod placement in first stage and tendon graft reconstruction in second stage. Per-operatively tenolysis of FDS was done and on exploration of FDP it was noted that the FDP tendon was ruptured at the level of fracture and the proximal end was found entrapped in the healed fracture site while distal part of the flexor sheath contained the distal end of tendon and so A2-A5 pulleys were not collapsed Fig 2.

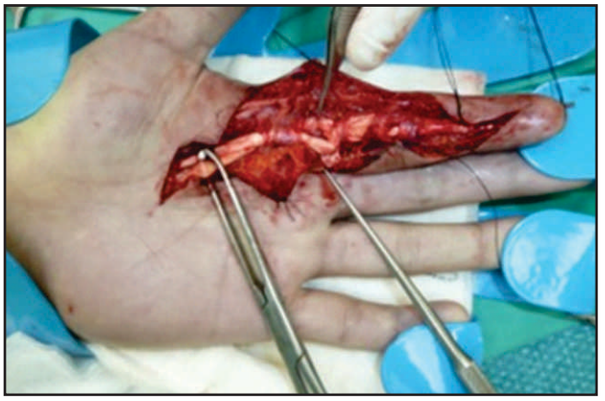

Fig. 2. FDP rupture and entrapment in proximal phalangeal fracture.

Proximal and distal ends of tendons were released but decision was made not to do primary repair due to ruptured ends of tendons being atrophic Fig.3.

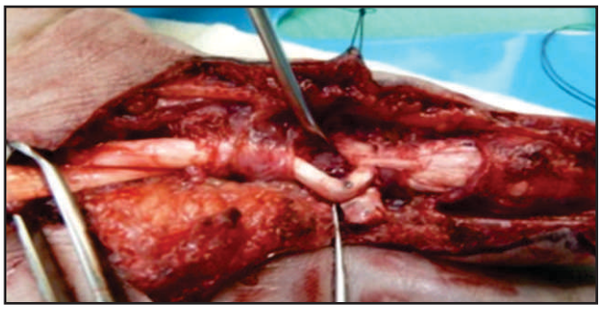

Fig. 3. Fracture site in proximal phalanx with atrophic tendon ends.

A tendon graft was harvested from Palmaris longus of the left wrist and was passed under A2-A5 pulleys and proximal tendon repair was done in Zone 3 by pulver tuft with FDP of index finger while distal end was repaired to distal end of FDP at distal phalanx level Fig.4.

Fig. 4. FDP reconstruction with tendon graft showing tendon repairs in zone I and zone III.

The tension of graft was adjusted ta achieve a normal finger cascade Fig.5

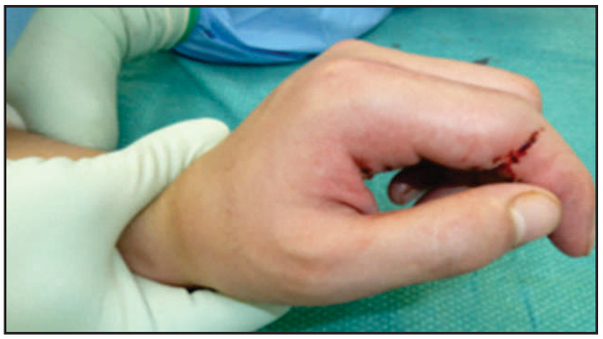

Fig. 5. Finger posture after adjusted flexor tendon tension with tendon graft.

Discussion:

Hands being the most exposed part of the body are highly vulnerable to injuries. Due the highly diverse nature of activities that hands are involved in a proper management of injuries involving hand are of vital importance including soft tissue, nerves vessels, tendons and bones. Phalangeal fractures are quite common in traumatic settings. These phalangeal fractures can be managed conservatively, by splints, closed reduction and pinning or open reduction and internal fixation depending upon the nature (open or closed) and stability of fractures. Phalangeal fractures are very rarely associated with the entrapment of flexor tendons in adult patients and the rupture of the entrapped tendon is even rare. In literature Macknin and Malone[3] reported tendon rupture in a 58 years old patient with proximal phalangeal fracture but there was no evidence of entrapment. In this case the patient was managed non-operatively and she noticed a sudden snap about 5 weeks after her initial fracture. Per-operatively a bony prominence was found under the tendon sheath from the healing of fracture. Tendon reconstruction was also achieved by a tendon graft in that case. Flexor tendon entrapment in phalangeal fractures is relatively more common in pediatric age group, especially with physeal fractures. In a case report in pediatric age group Rodriguez and Pretell[1] reported a juxta -epiphyseal proximal phalanx fracture with flexor digitorum profundus entrapment in an 11years old child without rupture. In this case the closed reduction of fracture could not be achieved due to entrapment of tendon and open reduction and release of flexor tendon could be achieved. Harryman and Jordan[3] also reported a similar flexor tendon entrapment in a phalangeal epiphyseal fracture in a 12 years old child with no

rupture. The way in which the presented case is unique from all these cases is that the flexor digotorum profundus tendon apparently got entrapped in the initial fracture of proximal phalanx and was also ruptured which has not been reported before, in our knowledge. A similar flexor tendon entrapment in a longitudinal split fracture of proximal phalanx in 4 years old patient was reported by Nogueira and Alvarez[6]. In an older case report, Jones and Schenk[4] presented the phalangeal entrapment of flexor tendon, which was diagnosed on X-ray examination and findings were confirmed on surgical exploration. The flexor tendon was also not ruptured in this case too. They have also described certain radiological feature of a fracture with entrapped tendon in it that there is a central cystic defect with sclerotic margin around it. When we retrospectively evaluated the X-rays of our patient we found similar findings. Tarun and Salwa[5] also reported a case of a 22years old patient with fracture of proximal phalanx of index finger in which flexor digitorum profundus was entrapped resulting in non-union of fracture. The authors suggested that high-resolution ultrasound is an effective tool in identification of such bone and tendon pathologies. CT scan and MRI are other helpful tools, which help in definitive diagnosis in such conditions.

The pitfall in our case is that the finding of flexion deficit in finger was missed in first instance prior to the first surgery for fracture fixation. But it was pain in the injured patient finger that prevented a more thorough examination. This makes it uncertain that the tendon entrapment and rupture occurred in primary trauma causing fracture or during first surgery for fracture fixation. But points in favor of the tendon entrapment during primary injury include the history of patient claiming to have flexion dysfunction after the fracture itself. Also the fracture was never approached from volar aspect during fixation and neither was much manipulation was carried out since fracture alignment was quite good. Secondly retrospective evaluation of X-rays from prior to surgery show some cystic changes in fracture site Fig.6.

Fig. 6. X-Ray showing cystic changes around entrapment of flexor tendon in phalangeal fracture site.

which is in accordance with findings in John and Roberts' features of entrapment.

So we conclude that entrapment and rupture of flexor tendon in a phalangeal fracture is a possibility and it should be kept in mind when managing a patient complaining of some flexion deficit associated with fracture. X-ray, Ultrasound and MRI are good adjuncts but diagnosis is primarily clinical. If diagnosed early then release and primary repair of tendon can be achieved.

References:

1. Rodríguez VV, Pretell-MJ, Marti-Ciruelos R, Jorge MA, de la Mano AC. Simultaneous juxta-epiphyseal proximal phalanx fracture with flexor tendon entrapment in a child: a case report and review of literature. J Pediatr Orthop B. 2013 Mar;22(2):148-152.

2. Harryman DT, Jordan TF. Physeal phalangeal fracture with flexor tendon entrapment. A case report and review of the literature. Clin Orthop Relat Res. 1990 Jan;(250):194-196.

3. Macknin JB, Malone KJ. Zone 2 flexor digitorum profundus and superficialis rupture treated with single-stage tendon reconstruction using an Active Hunter Rod Implant. Orthopedics. 2012 May;35(5):e758-761.

4. Jones JM, Schenck RR. Phalangeal entrapment of the flexor tendon--roentgenographic presentation. A case report. J Bone Joint Surg Am. 1980 Jan;62(1):136-137.

5. Tasrun P, Salwa RMK and Salem AAS. Sonographic Diagnosis of Entrapment of the Flexor Digitorum Profundus Tendon Complicating a Fracture of Index Finger. J Clin Ultr. 2008 Jul/Aug;3696:371-373.

6. Nogueira A, Alvarez R, Iglesias F. Irreducible phalangeal fracture in a child due to flexor tendon entrapment. J Hand Surg Am. 1999 Sep;24(5):924-927.