The Risk of Sural Nerve Injury during Achilles Tendon Repair Using the Achillon Device: A Cadaveric Study

Johnny Arnouk, MD
Ashish Patel, MD
Yevgeniy Korshunov, MD
Joshua Mitgang, MD
Hebah El-Gendi, MS
Jaime Uribe, MD
My disclosure is in the Final AOFAS Program Book. I have no potential conflicts with this presentation.
INTRODUCTION

- Despite being the strongest tendon, it is also the most commonly ruptured
  - 80-90% of ruptures occur 2-6cm proximal to the calcaneus insertion

- Conventional Open Approach to Achilles tendon Repair (ATR)
  - Associated with wound breakdown and infection

- Mini-Open/Percutaneous Methods for ATR
  - May reduce risk of iatrogenic wound complications → reducing surgical morbidity
INTRODUCTION

- HOWEVER, ‘blind’ ATR using percutaneous methods risks damage to the sural nerve

- Achillon Device ➔ Used for percutaneous ATR
  - By placing device within paratenon, sutures are pulled down beneath the paratenon
  - From extracutaneous to a peritendinous position
  - Preventing entrapment of sural nerve

- BUT, the sural nerve still remains at risk of injury during needle placement through the skin
INTRODUCTION

Objective of Study:

Using the Achillon device, the current investigation aimed to quantify the risk of sural nerve injury during ATR, in a cadaveric model.
Materials and Methods

- 18 intact embalmed cadaveric left lower extremities used
- 2cm longitudinal incision made over the midline of the Achilles tendon; 4cm proximal to the most proximal palpable aspect of the calcaneus
- Achilles tendon dissected out and pulled through incision
- Paratenon and Achilles Tendon cut in transverse fashion
- Achillon device used as per protocol
Materials and Methods

- Achillon Instrument inserted proximally underneath paratenon
- 3 percutaneous needle passers, each with no. 2 fiber wire sutures, inserted from medial to lateral direction
Materials and Methods

- With Achillon still in place, formal dissection completed to
  - Localize needle/suture course
  - Identify its relation to sural nerve (hit or miss)
Results

- 18 cadavers: 54 needle passes
- 5 of 18 had at least 1 suture passing through sural nerve (28%)
- 8 needle passes directly pierced sural nerve (14.8%)
  - 4 (50%) through needle passer #1 (proximal)
  - 3 (38%) through needle passer #2 (middle)
  - 1 (12%) through needle passer #3 (distal)
Results

Percentage Sural Nerve Violation by Needle Passer Outlet (n=18 passes/outlet)

[Bar chart showing Sural Nerve Violation (%) for Outlet 1, Outlet 2, and Outlet 3]
Results

- Suture pulled through sural nerve with retrieval of the Achillon Device
- No transection of sural nerve
Conclusion

- Incidence of acute achilles tendon ruptures is on the rise

- Controversy still exists → appropriate surgical approach to minimize iatrogenic morbidity

- Advantages of Achillon device vs. Conventional open repair:
  - Reduction in wound complications; ease of repair
Conclusion

- There is an inherent risk to the sural nerve using percutaneous methods of ATR, such as the Achillon device.

- In this study:
  - 28% risk of sural nerve injury per specimen
  - 14.8% risk of sural nerve injury from each needle pass
Conclusion

- Sutures pulled out through sural nerve as Achillon was being retrieved
  - Further injury can occur as entirety of suture is pulled through substance of nerve
  - Can explain patients presenting with post-operative paresthesias/numbness in distribution of sural nerve

- Substantial risk to sural nerve remains when using the Achillon device for ATR

- What’s next?
  - Will rotation of the Achillon device help minimize trauma to the sural nerve?
References