

Case conference and EBM discussion

Department of Orthopediatrics
Kaohsiung Municipal Hsiaokang Hospital

R: 阮璿儀 2007.6.25

Patient profile

- Name : 鍾 X 宏
- Gender : male
- Age : 19 years old
- Chart number : 01857911
- Occupation : student

Chief complaint

- A cutting wound about 8 cm on Calcaneal tendon (Achilles tendon) of right foot

Present illness

- The 19 year-old male was well being before.
- His right Achilles tendon got cut when he was working.
- There was a wound about 8 cm on his right ankle, with Achilles tendon exposure.
- Severe pain with limited ROM was noted.
- Therefore, he was brought to our ER by 119.

Past history

- Diabetes mellitus : (-)
- Hypertension : (-)
- Drug allergy : denied
- Medication history : (-)
- Operation history : (-)
- Admission history : (-)

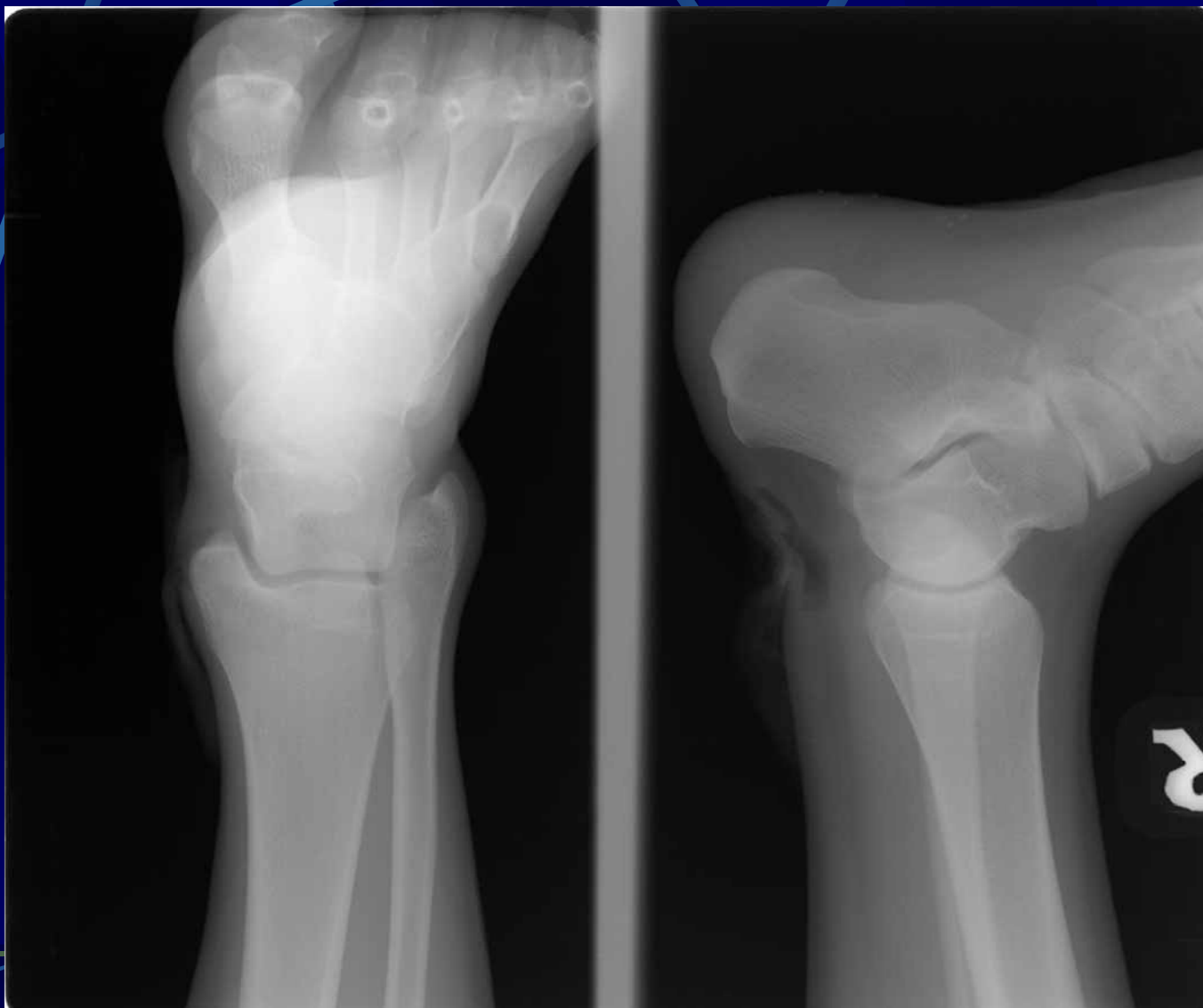
Physical examination

- Vital sign : stable, not febrile
- Consciousness: ALERT
- HEENT
 - Conjunctiva: not pale; Sclera: not icteric
 - Nose: patent; Ear: No hearing impairment
- Neck: supple, JVE (-), Lymphadenopathy(-)
- Chest: symmetric expansion
 - **Heart sound : no murmur**
 - **Breathing sound: bilateral clear**
- Abdomen: soft, no palpable mass
 - Bowel sound: normoactive
- Extremities: not pitting edema

Physical examination

- Right ankle :
 - A cutting wound about 8cm in width
 - Achilles tendon exposure
 - Limited ROM
 - Thompson's test (+)

Image



Diagnosis

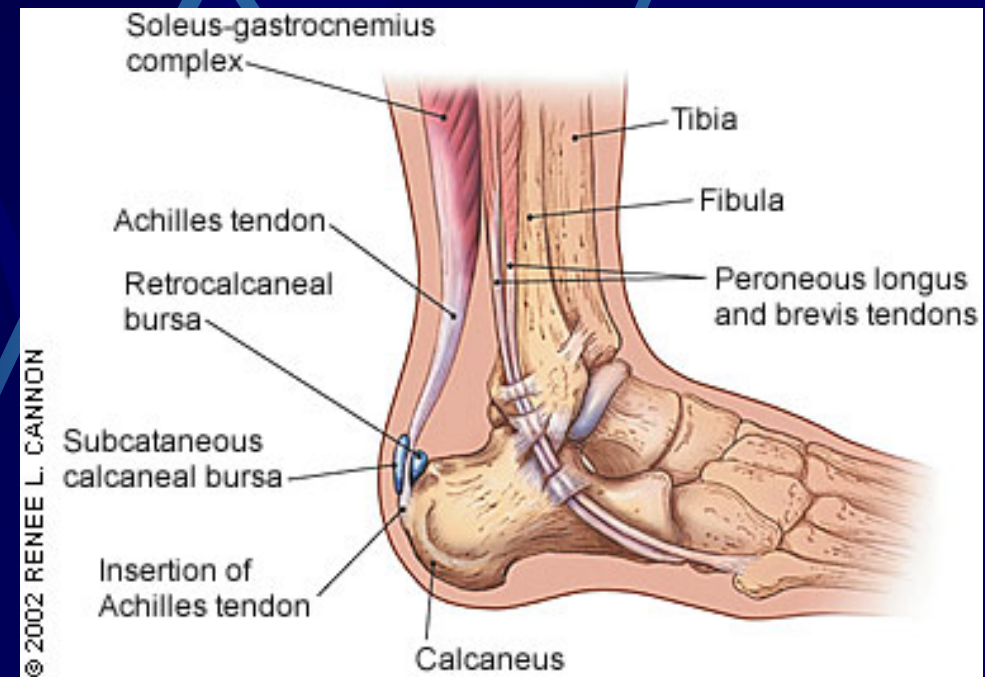
- Right Achilles tendon rupture with cutting wound about 8 cm

Plan

- Debridement and Tendon repair
- Keep plantar flexion of the right foot
- Immobilization with short leg splint

Discussion

- The Achilles tendon is the largest and strongest tendon in the body
- Acute Achilles tendon ruptures occur most commonly in males in their third and fourth decades who play sport intermittently



Discussion

- The most vulnerable area of the Achilles tendon is between 2 and 6 cm above the calcaneal insertion.

Discussion

- The pathological mechanism is not understood, although it is generally accepted that ruptures occur in previously abnormal tendons.
- the adverse influence of oral and topical corticosteroids, fluoroquinolone antibiotics, exercise-induced hyperthermia, mechanical abnormalities of the foot are associated with Achilles tendon rupture

Discussion

clinical triad:

- a palpable gap
- an abnormal resting posture or “angle of dangle” of the foot
- the calf squeeze test (Thompson’s test)

Discussion

- an abnormal resting posture or “angle of dangle” of the foot



Discussion

- the calf squeeze test (Thompson's test)



The slide features a dark blue background with several light blue, semi-transparent lines crisscrossing diagonally. The text 'EBM Discussion' is centered in a yellow, sans-serif font. The letter 'B' is replaced by a small, 3D-style globe icon with a blue and green color scheme.

EBM Discussion

A 4-part Clinical Question

- **Patient :**

A patient with Achilles tendon rupture

- **Intervention :**

surgical treatment

- **Comparison :**

1. surgical treatment with conservative treatment
2. Post-surgical early functional treatment vs. immobilization

- **Outcome :**

1. Open operative repair significantly reduces the risk of re-rupture, but a significantly higher risk of other complications, including wound infection
2. Early ROM is better than immobilization

One-sentenced Question

- Which treatment to Achilles tendon rupture resulted a better prognosis ?
 1. *Conservative treatment or Surgery*
 2. *Early functional treatment or immobilization*
- Type of question: therapy

database

- Data Base :

- Cochrane Library
- EBMR
- Surgical treatment : evidence based and problem-Oriented
- PubMed
- Medline

- Key words :

- achilles tendon rupture, treatment

Search result

● Results

- Cochrane Library ⇒ 1
- EBMR ⇒ 0
- Evidence-Based Medicine ⇒ 0
- Surgical treatment : evidence based and problem-Oriented⇒0
- PubMed⇒ 3
- Medline ⇒ 6

EBM-1.1

- ***Interventions for treating acute Achilles tendon ruptures (Review)***
- Khan RJK, Fick D, Brammar TJ, Crawford J, Parker MJ.. *The Cochrane Database of Systematic Reviews* 2004, Issue 3. Art. No.: CD003674.pub2. DOI: 10.1002/14651858.CD003674.pub2.
- Date of Most Recent Update: 24-August-2005

Abstract (I)

- **Search strategy** : multiple databases including the Cochrane Musculoskeletal Injuries Group specialized register (to September 2003)
- **Keywords** : Achilles Tendon, Rupture, and Tendon Injuries.
- **Selection criteria** : All randomised and quasi-randomised trials comparing different treatment regimens for acute Achilles tendon ruptures.
- **Results** : 14 trials involving 891 patients

Level	Therapy/Prevention, Aetiology/Harm	Prognosis	Diagnosis	Differential diagnosis/symptom prevalence study	Economic and decision analyses
1a	SR (with <u>homogeneity*</u>) of RCTs	SR (with <u>homogeneity*</u>) of inception cohort studies; <u>CDR†</u> validated in different populations	SR (with <u>homogeneity*</u>) of Level 1 diagnostic studies; <u>CDR†</u> with 1b studies from different clinical centres	SR (with <u>homogeneity*</u>) of prospective cohort studies	SR (with <u>homogeneity*</u>) of Level 1 economic studies
1b	Individual RCT (with narrow <u>Confidence Interval‡</u>)	Individual inception cohort study with ≥ 80% follow-up; <u>CDR†</u> validated in a single population	Validating** cohort study with <u>good†††</u> reference standards; or <u>CDR†</u> tested within one clinical centre	Prospective cohort study with good follow-up****	Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence; and including multi-way sensitivity analyses
1c	<u>All or none§</u>	All or none case-series	<u>Absolute SpPins and SnNouts††</u>	All or none case-series	Absolute better-value or worse-value analyses ††††
2a	SR (with <u>homogeneity*</u>) of cohort studies	SR (with <u>homogeneity*</u>) of either retrospective cohort studies or untreated control groups in RCTs	SR (with <u>homogeneity*</u>) of Level >2 diagnostic studies	SR (with <u>homogeneity*</u>) of 2b and better studies	SR (with <u>homogeneity*</u>) of Level >2 economic studies
2b	Individual cohort study (including low quality RCT; e.g., <80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of <u>CDR†</u> or validated on split-sample§§§ only	Exploratory** cohort study with <u>good†††</u> reference standards; <u>CDR†</u> after derivation, or validated only on split-sample§§§ or databases	Retrospective cohort study, or poor follow-up	Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses
2c	"Outcomes" Research; Ecological studies	"Outcomes" Research		Ecological studies	Audit or outcomes research
3a	SR (with <u>homogeneity*</u>) of case-control studies		SR (with <u>homogeneity*</u>) of 3b and better studies	SR (with <u>homogeneity*</u>) of 3b and better studies	SR (with <u>homogeneity*</u>) of 3b and better studies
3b	Individual Case-Control Study		Non-consecutive study; or without consistently applied reference standards	Non-consecutive cohort study, or very limited population	Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations.
4	Case-series (and <u>poor quality cohort and case-control studies§§</u>)	Case-series (and <u>poor quality prognostic cohort studies***</u>)	Case-control study, poor or non-independent reference standard	Case-series or superseded reference standards	Analysis with no sensitivity analysis
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on economic theory or "first principles"

Abstract (II)

- *Comparison 01*
Open operative versus non-operative treatment
- *Comparison 02*
Post-operative splintage: cast immobilization versus functional brace
- *Comparison 03*
Open versus percutaneous surgical repair
- *Comparison 04*
Two-strand versus six-strand open repair
- *Comparison 05*
Non-operative treatment: cast versus functional brace

Conclusions (I)

- Open operative repair significantly **reduces the risk of rerupture** compared to non-operative treatment (plaster cast or functional brace) but has the drawback of a significantly **higher risk of other complications**, including wound infection.
- These complications may be **reduced** by performing surgery percutaneously (through a number of very short skin incisions).

Conclusions (II)

- Post-operative splintage in a **functional brace** rather than a **cast** appears to **reduce** hospital stay, time off work and sports, and may lower the overall complication rate.
- Further well-conducted research is needed.

EBM-1.2

- ***Operative versus nonoperative treatment of acute Achilles tendon ruptures: a quantitative review***
- Lo, IK. Kirkley, A. Nonweiler, B. Kumbhare DA. Journal Article. Meta-Analysis
- Clinical Journal of Sport Medicine. 7(3):207-11, 1997 Jul.

Abstract (I)

- **OBJECTIVE:** To determine the optimal treatment of acute **Achilles tendon** ruptures
- **DATA SOURCES:** A comprehensive search for all of the English articles published between 1959 and 1997
- **DATA EXTRACTION:** The main outcomes extracted were strength, time to return to work, frequency of return to sports, rerupture rate, and complications. Complications were divided into major, moderate, and minor categories.

Level	Therapy/Prevention, Aetiology/Harm	Prognosis	Diagnosis	Differential diagnosis/symptom prevalence study	Economic and decision analyses
1a	SR (with homogeneity*) of RCTs	SR (with homogeneity*) of inception cohort studies; CDR† validated in different populations	SR (with homogeneity*) of Level 1 diagnostic studies; CDR† with 1b studies from different clinical centres	SR (with homogeneity*) of prospective cohort studies	SR (with homogeneity*) of Level 1 economic studies
1b	Individual RCT (with narrow Confidence Interval‡)	Individual inception cohort study with ≥ 80% follow-up; CDR† validated in a single population	Validating** cohort study with good††† reference standards; or CDR† tested within one clinical centre	Prospective cohort study with good follow-up****	Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence; and including multi-way sensitivity analyses
1c	All or none§	All or none case-series	Absolute SpPins and SnNouts††	All or none case-series	Absolute better-value or worse-value analyses ††††
2a	SR (with homogeneity*) of cohort studies	SR (with homogeneity*) of either retrospective cohort studies or untreated control groups in RCTs	SR (with homogeneity*) of Level >2 diagnostic studies	SR (with homogeneity*) of 2b and better studies	SR (with homogeneity*) of Level >2 economic studies
2b	Individual cohort study (including low quality RCT; e.g., <80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of CDR† or validated on split-sample§§§ only	Exploratory** cohort study with good††† reference standards; CDR† after derivation, or validated only on split-sample§§§ or databases	Retrospective cohort study, or poor follow-up	Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses
2c	"Outcomes" Research; Ecological studies	"Outcomes" Research		Ecological studies	Audit or outcomes research
3a	SR (with homogeneity*) of case-control studies		SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies
3b	Individual Case-Control Study		Non-consecutive study; or without consistently applied reference standards	Non-consecutive cohort study, or very limited population	Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations.
4	Case-series (and poor quality cohort and case-control studies§§)	Case-series (and poor quality prognostic cohort studies***)	Case-control study, poor or non-independent reference standard	Case-series or superseded reference standards	Analysis with no sensitivity analysis
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on economic theory or "first principles"

Conclusions (I)

- Operative treatment provides a **reduced rerupture rate** compared with nonoperative treatment (2.8% versus 11.7%, $p < 0.001$)
- The minor and moderate complication rate of operative treatment is **20 times greater**.
- The difference in rates for major complications was not statistically significant

Conclusions (II)

- Treatment should be individualized to the concerns and health of the patient.
- Future clinical trials are necessary to determine the optimal method of both operative and conservative treatment.

EBM-1.3

- ***Operative versus nonoperative treatment of Achilles tendon rupture. A prospective randomized study and review of the literature. [Review] [90 refs]***
- Cetti R. Christensen SE. Ejsted R. Jensen NM. Jorgensen U.
- Clinical Trial. Journal Article. Randomized Controlled Trial. Review
- *American Journal of Sports Medicine. 21(6):791-9, 1993 Nov-Dec.*

Abstract

- 111 patients with acute rupture of the Achilles tendon were included in a prospective trial and randomly assigned to groups for operative (56 patients) or nonoperative (55 patients) treatment
- All of the patients were followed with clinic evaluations at 4 months and 1 year after the rupture.

Conclusions

- There were **fewer minor complications** in the nonoperative group than in the operative group.
- The **operatively treated** patients had a significantly higher rate of resuming sports activities at the same level, a lesser degree of calf atrophy, better ankle movement, and fewer complaints 1 year after the accident.
- **operative treatment** of ruptured Achilles tendons **is preferable**, but nonoperative treatment is an acceptable alternative.

EBM-2.1

- ***Early weightbearing and ankle mobilization after open repair of acute midsubstance tears of the achilles tendon***
- Maffulli N. Tallon C. Wong J. Lim KP. Bleakney R.
- Clinical Trial.
- Journal Article] American Journal of Sports Medicine. 31(5):692-700, 2003 Sep-Oct.

Abstract (I)

- Group 1 were postoperatively immobilized with their ankle in gravity equinus, they were encouraged to bear weight on the operated limb as soon as possible to full weightbearing
- They received a single cast change at 2 weeks, with the ankle accommodated in an anterior splint in a plantigrade position, allowing the ankle to be plantar flexed fully but not dorsiflexed above neutral.

Abstract (II)

- Group 2 were immobilized with their ankle in full equinus with a cast change at 2 weeks, when the ankle was immobilized in mid equinus at 4 weeks, when the ankle was immobilized in a plantigrade position, and they were advised to bear weight.

Level	Therapy/Prevention, Aetiology/Harm	Prognosis	Diagnosis	Differential diagnosis/symptom prevalence study	Economic and decision analyses
1a	SR (with <u>homogeneity*</u>) of RCTs	SR (with <u>homogeneity*</u>) of inception cohort studies; <u>CDR†</u> validated in different populations	SR (with <u>homogeneity*</u>) of Level 1 diagnostic studies; <u>CDR†</u> with 1b studies from different clinical centres	SR (with <u>homogeneity*</u>) of prospective cohort studies	SR (with <u>homogeneity*</u>) of Level 1 economic studies
1b	Individual RCT (with narrow <u>Confidence Interval‡</u>)	Individual inception cohort study with ≥ 80% follow-up; <u>CDR†</u> validated in a single population	Validating** cohort study with <u>good†††</u> reference standards; or <u>CDR†</u> tested within one clinical centre	Prospective cohort study with good follow-up****	Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence; and including multi-way sensitivity analyses
1c	<u>All or none§</u>	All or none case-series	<u>Absolute SpPins and SnNouts††</u>	All or none case-series	Absolute better-value or worse-value analyses ††††
2a	SR (with <u>homogeneity*</u>) of cohort studies	SR (with <u>homogeneity*</u>) of either retrospective cohort studies or untreated control groups in RCTs	SR (with <u>homogeneity*</u>) of Level >2 diagnostic studies	SR (with <u>homogeneity*</u>) of 2b and better studies	SR (with <u>homogeneity*</u>) of Level >2 economic studies
2b	Individual cohort study (including low quality RCT; e.g., <80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of <u>CDR†</u> or validated on split-sample§§§ only	Exploratory** cohort study with <u>good†††</u> reference standards; <u>CDR†</u> after derivation, or validated only on split-sample§§§ or databases	Retrospective cohort study, or poor follow-up	Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses
2c	"Outcomes" Research; Ecological studies	"Outcomes" Research		Ecological studies	Audit or outcomes research
3a	SR (with <u>homogeneity*</u>) of case-control studies		SR (with <u>homogeneity*</u>) of 3b and better studies	SR (with <u>homogeneity*</u>) of 3b and better studies	SR (with <u>homogeneity*</u>) of 3b and better studies
3b	Individual Case-Control Study		Non-consecutive study; or without consistently applied reference standards	Non-consecutive cohort study, or very limited population	Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations.
4	Case-series (and <u>poor quality cohort and case-control studies§§</u>)	Case-series (and <u>poor quality prognostic cohort studies***</u>)	Case-control study, poor or non-independent reference standard	Case-series or superseded reference standards	Analysis with no sensitivity analysis
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on economic theory or "first principles"

Conclusion

- Early weightbearing with the ankle plantigrade is **not detrimental** to the outcome of repair after acute rupture of the Achilles tendon and **shortens** the time needed for rehabilitation.
- However, strength deficit and muscle atrophy are not prevented.

EBM-2.2

- ***Recovering motor performance of the foot after Achilles rupture repair: a randomized clinical study about early functional treatment vs. early immobilization of Achilles tendon in tension.***
- Kauranen K. Kangas J. Leppilahti J.
- Clinical Trial.
- Journal Article. Randomized Controlled Trial
- *Foot & Ankle International. 23(7):600-5, 2002 Jul.*

Abstract

- The study population comprised 30 patients operated on for an acute, complete, closed AT rupture.
- The surgical technique was Kessler sutures plus one aponeurosis flap in all cases.
- Postoperatively the subjects were randomly divided to have immobilization with a plaster cast or an active brace.

Conclusion

- There were no statistically significant differences in the results between the operated and contralateral nonoperated lower extremities 12 and 24 weeks after the operation in either group.
- When the results were compared between the plaster cast and active brace groups, no statistically significant differences were seen in reaction times, speed of movement, tapping speed and anterior-posterior coordination on either side

EBM-2.3

- ***Early motion of the ankle after operative treatment of a rupture of the Achilles tendon. A prospective, randomized clinical and radiographic study.***
- Mortensen HM. Skov O. Jensen PE.
- Clinical Trial. Journal Article. Randomized Controlled Trial
- *Journal of Bone & Joint Surgery - American Volume. 81(7):983-90, 1999 Jul.*

Abstract (I)

- In a prospective study, 71 patients who had an acute rupture of the Achilles tendon were randomized to either conventional postoperative management with a cast for 8 weeks or early restricted motion of the ankle in a below-the-knee brace for 6 weeks.
- The patients were assessed clinically when the cast or brace was removed, at twelve weeks postoperatively, and at a median of sixteen months postoperatively.

Abstract (II)

- The patients managed with **early motion** had a smaller initial loss in the range of motion, and they returned to work and sports activities sooner than those managed with a cast.
- There were fewer visible adhesions between the repaired tendon and the skin in the patients managed with **early motion**, and these patients were subjectively more satisfied with the overall result.

Conclusions

- Early restricted motion appears to **shorten the time** needed for rehabilitation.
- There were **no complications** related to early motion in these patients.
- However, early unloaded exercises did not prevent muscle atrophy.

Applied to our patient

- Tendon repair with debridement
- Keep plantar flexion of the right foot
- Immobilization with short leg splint
- Early function motion may be advised



Thank you for your
attention !