



Tendinose/tendinopati

Tennisalbue

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“Problemområder” i klinikken

- Tennisalbue



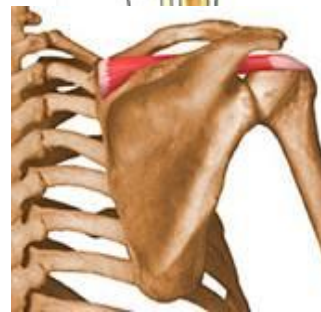
- Achilles



- Patellarsene/hopperkne

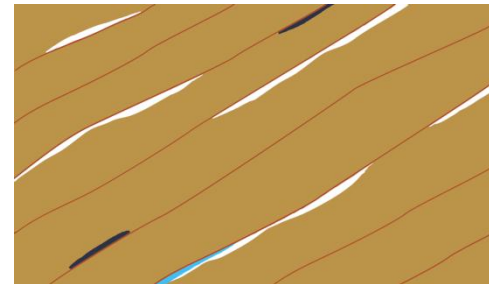


- Skulder/supraspinatus



Senens mikroanatomi

- Normal sene
 - Tett bindevev
 - Består av kollagen, grunnsubstans, celler og vann.
 - Cellene i senevev er hovedsakelig fibroblaster.



Bilder fra Karim Khan



Senens mikroanatomi

- Fibroblastene produserer den ekstracellulære matrix, herunder det kollagene vev
- Mellom kollagenet finnes grunnsustans
 - Glucosaminoglycaner
 - Proteoglycaner
- Kollagen type 1 er den viktigste bestanddel i senevev og er svært motstandsdyktig for strekk
- Kollagenets egenskaper og form gjør at senen kan sammenlignes med tauverk



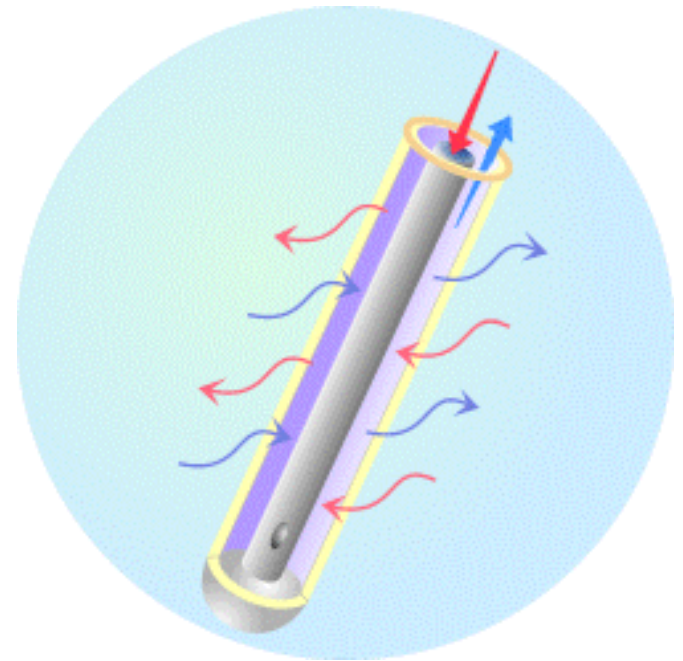
The "tendinitis myth"

- *For noen år siden:*
 - Årsak til smertene i en kronisk overbelastet sene: inflammasjon ("tendinit")

- *Nyere forskning:*
 - Fravær (i alle fall i stor grad) av inflammatoriske celler.
 - I stedet for inflammasjon ("tendinit") forstås tilstanden nå mer som en degenerasjon ("tendinose")

Microdialyse/biokjemi i kronisk syk sene

- Prostaglandin E2
 - Lett økning?
- Glutamat (neurotransmitter)
 - "neurogen inflammasjon"
 - Signifikant høyere verdier i syk sene
- Laktat
 - Signifikant høyere verdier i syk sene



Neovaskularisering

- Åstrøm & Rausing
 - Vaskularitet
 - Normalt sparsomt nettverk av små arterier parallelt med collagenfibrene
 - Patologisk irregulært mønster, grupper med tykkveggede årer, noen nodulære andre vinkelrett på fibrene



Bilde fra Karim Khan



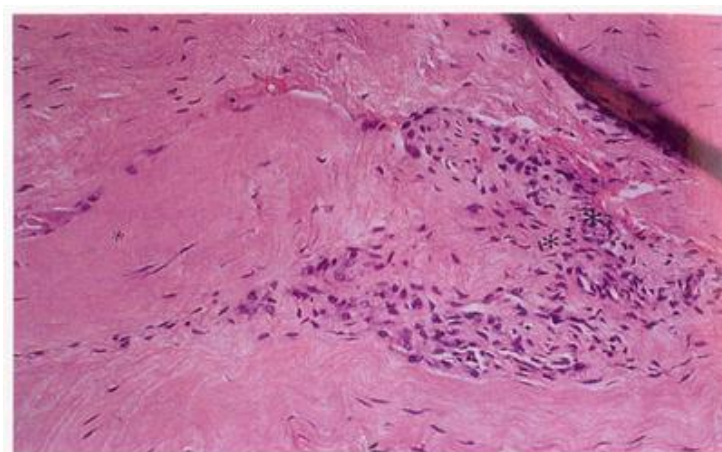
Neovaskularisering

Pufe T. Scand J Med Sci Sports 2005

- Områder med mekanisk overload og hypoxi øker konsentrasjonen av VEGF (vascular endothelial growth factor)
- VEGF stimulerer til karinnvekst men svekker samtidig de mekaniske egenskapene til senevevet.
 - Redusert stivhet
 - Redusert styrke

Tendinose

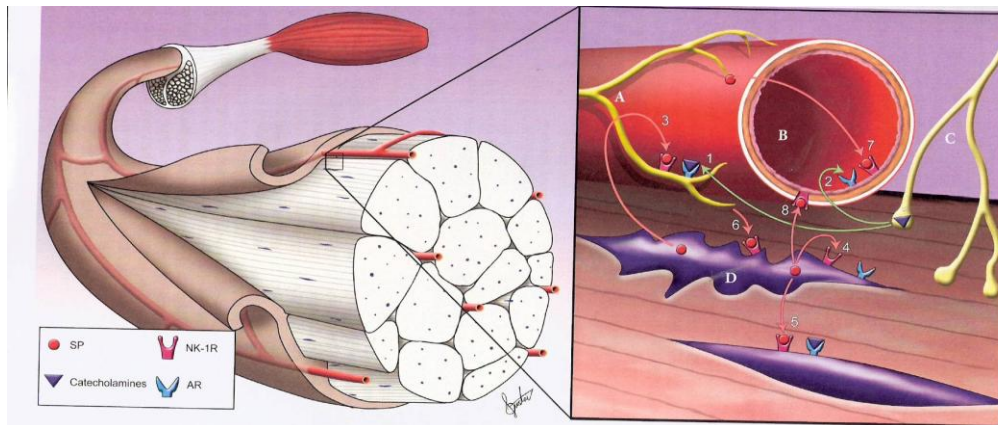
- Tendinose karakterisert ved
 - Mangel på inflammatoriske celler (dog forhøyet konsentrasjon av mastceller og neurale elementer og tilhørende neuropeptider), abnormal ekstracellulær matrix.
 - Dog en inflammatorisk komponent til stede? Blanding -itis/osis ved enkelte tilstander?



- Histologi ved tendinose

Utvikling av tendinose

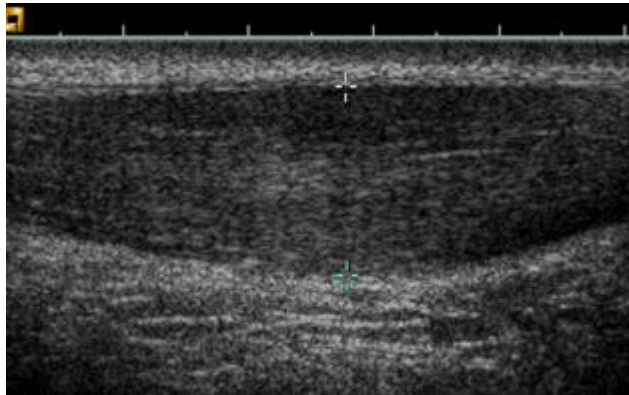
- Eksessive biomekanisk belastning
- Kronisk dysregulasjon av biologisk reparasjonsprosess (genetiske variasjoner?)
- "Nerve – mast celle – myofibroblast" -akse medvirkende til feilslått reparasjon?
- Substance P spiller sannsynligvis en viktig rolle



- Tenocyte hypercellularity and vascular proliferation in a rabbit model of tendinopathy: contralateral effects suggest the involvement of central neuronal mechanisms
- There was a significant increase in the tenocyte number after 3 and 6 weeks of exercise, but not after 1 week, in comparison with the control group. This was seen in the Achilles tendons of **both legs** in experimental animals, including the unexercised limb. The pattern of vascularity showed an increase in the number of tendon blood vessels in rabbits that had exercised for 3 weeks or more, compared with those who had exercised for 1 week or not at all. VEGF-mRNA was detected in the investigated tissue, with the reactions being more clearly detected in the tendon tissue with tendinosis-like changes (6-week rabbits) than in the normal tendon tissue (control rabbits).
- Conclusions: There were bilateral tendinosis-like changes in the Achilles tendons of rabbits in the current model after 3 weeks of training, suggesting that central neuronal mechanisms may be involved and that the contralateral side is not appropriate as a control.

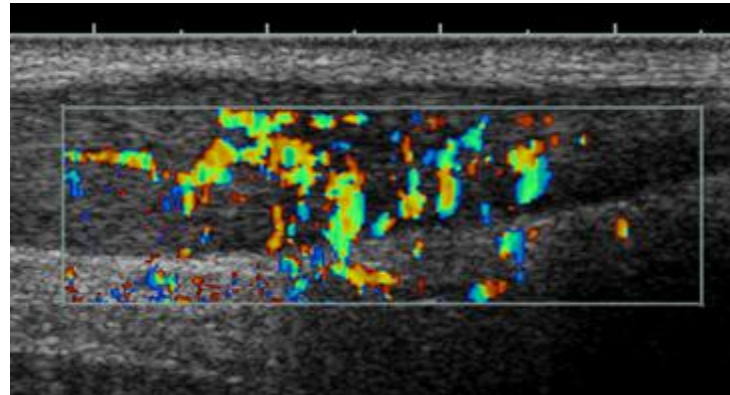
Eksempel fra achillessene

Ultralyd achillestendinose



Spoleformet, fortykket sene i midtporsjon

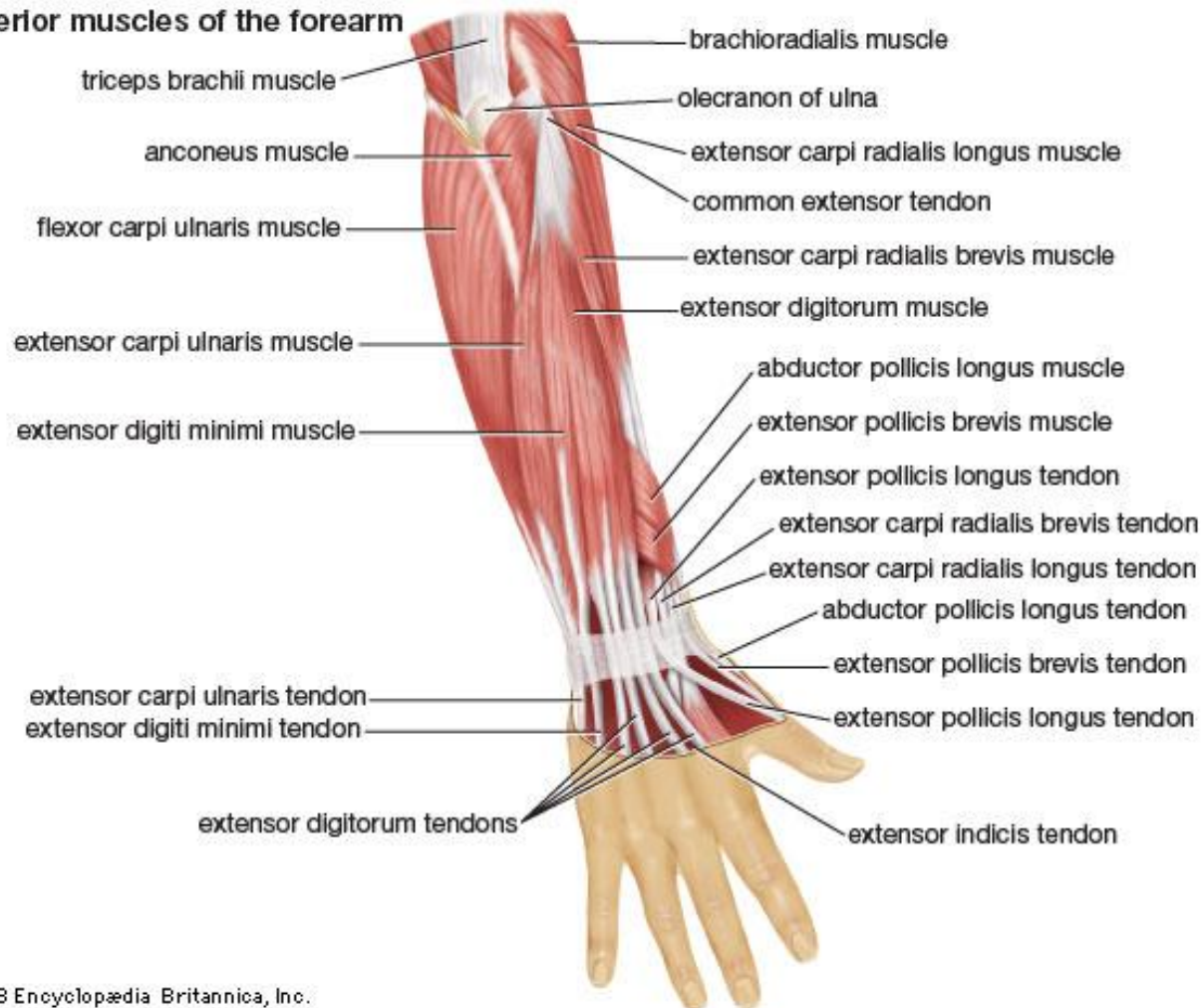
Ultralyd med Doppler



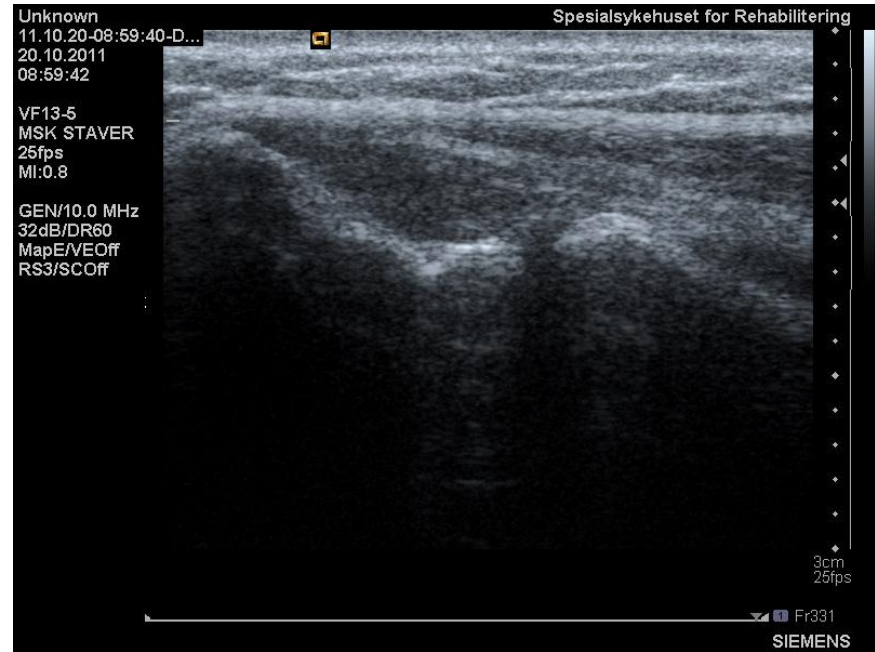
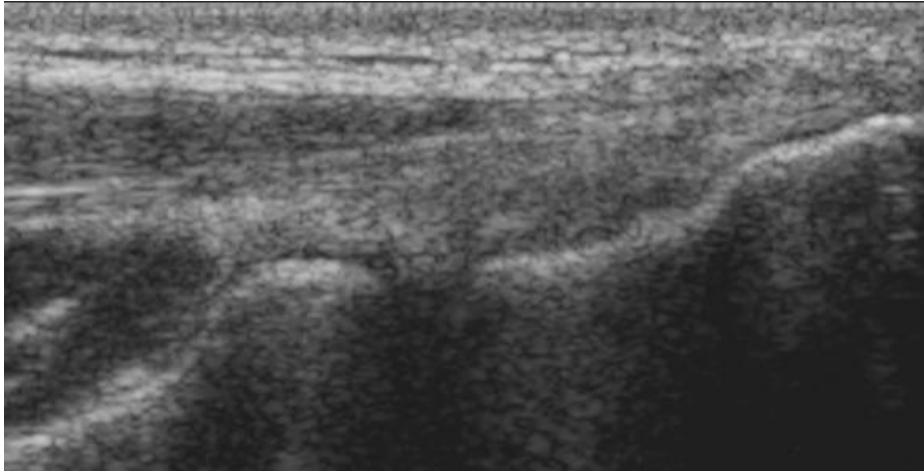
Kar fra ventralsiden av sene kommer inn vinkelrett på fiberretning

Anatomi albue/underarm

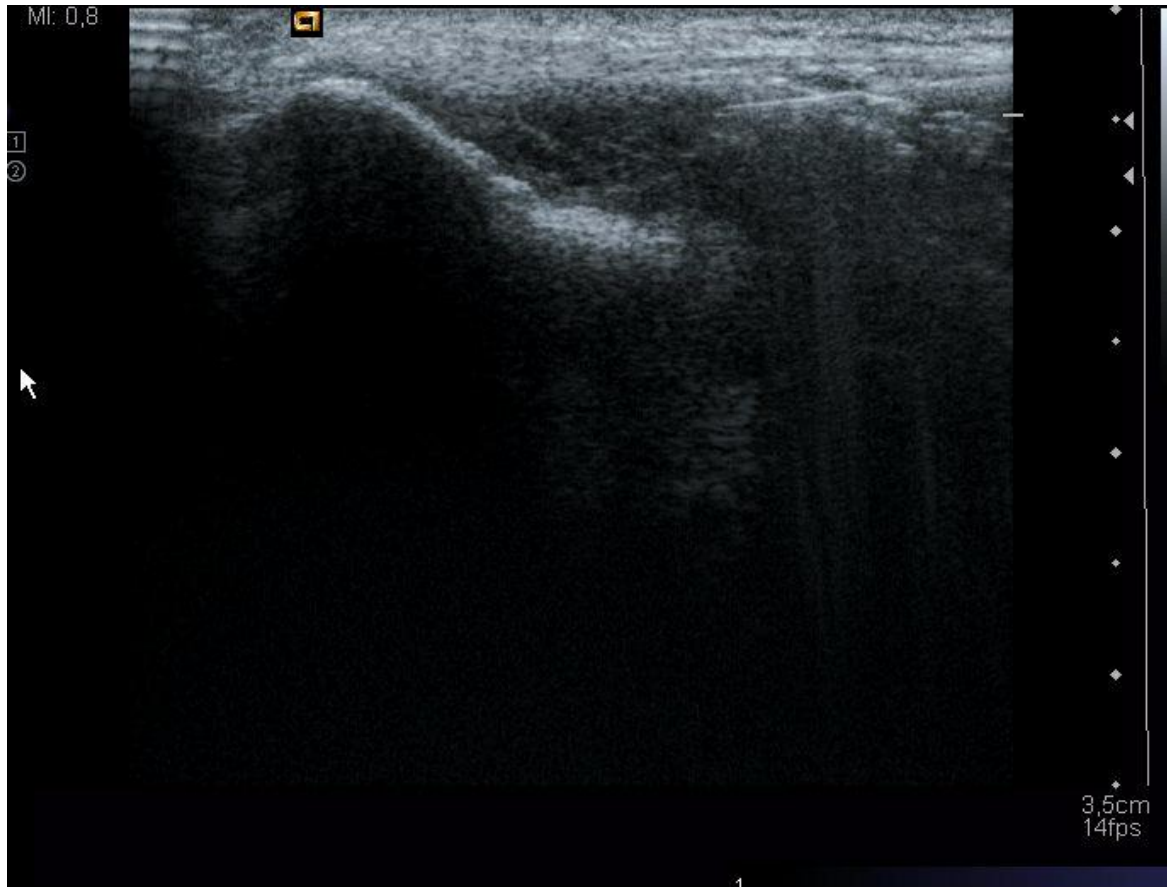
Posterior muscles of the forearm



Tennisalbue



Tennisalbue



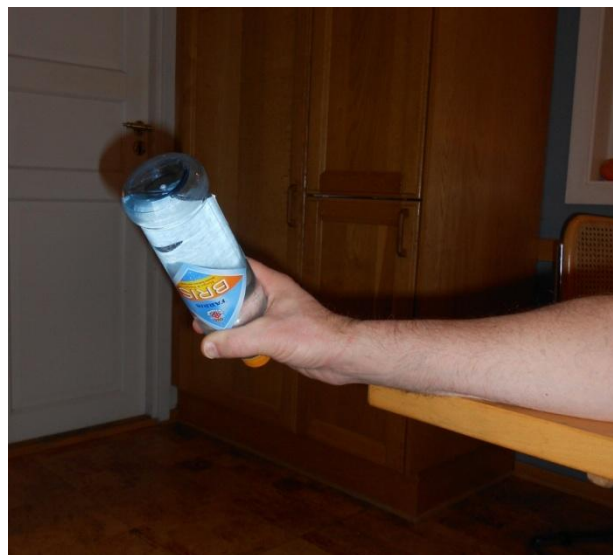
Behandling

- Tilpasset aktivitet
- Ortose
- Fysikalsk behandling/Eksentrisk trening
 - UpToDate:
 - **Physical therapy and eccentric exercise** — We have found well-designed *physical therapy programs* to be effective initial treatment for many patients with epicondylitis. Effective programs may include progressive eccentric and isometric strengthening, incorporating flexibility training and other modalities as needed.
 - Nevertheless, a systematic review of 23 randomized control trials involving physical therapy for lateral epicondylitis found insufficient evidence to demonstrate benefit. We believe inconsistencies in methodologic quality and the *wide range of approaches to physical therapy* in the studies reviewed account for this conclusion.

- A number of studies in conditions such as Achilles' tendinopathy suggest that daily **eccentric** isokinetic strengthening exercises provide effective treatment for chronic tendinopathy.
- Extrapolating from such studies, some researchers advocate this rehabilitative approach for epicondylitis and we believe such exercises should be included in physical therapy.



Eksentrisk trening





Kortisoninjeksjoner

- UpToDate:
 - **Glucocorticoid injections** — ...glucocorticoid injection for lateral epicondylitis improves many short-term (six week) outcome measures, but does not prevent recurrence and *may lead to worse long-term outcomes*.
 - For short-term relief of severe symptoms, glucocorticoid injection is a reasonable treatment option when used as part of a comprehensive management program including physical therapy.
 - We do not advocate multiple injections.

"Dry needling"

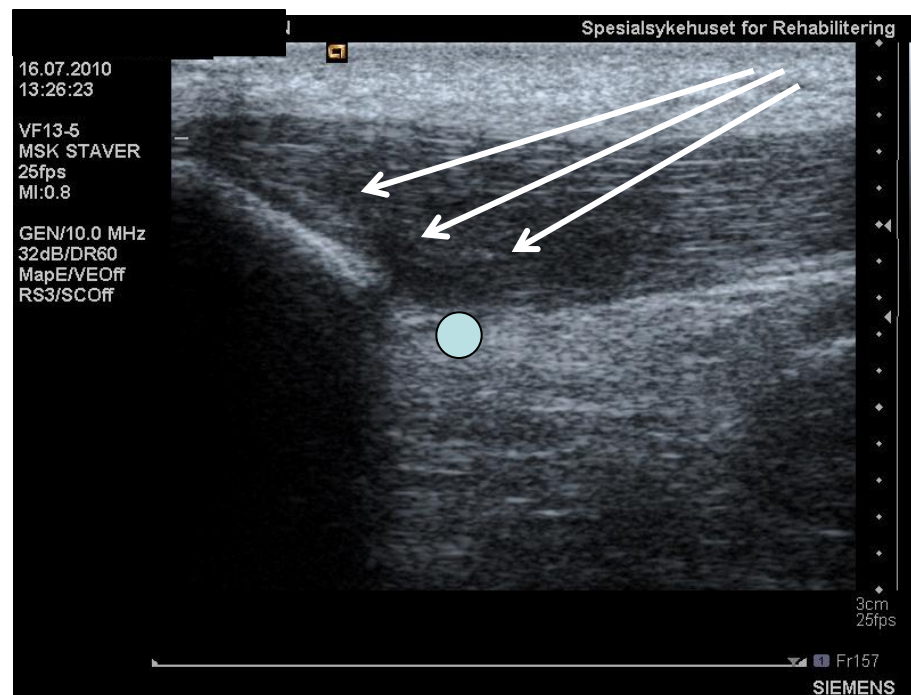
- Dry needling-begrepet er upresist.
- Alt fra "nåling" av triggerpunkter og vond muskulatur med akupunktur nåler til behandling med eksempelvis 21G-nåler
- På forhånd lokal- eller ledningsanestesi
- Ofte injeksjon med anestesi eller saltvann mens det stikkes/nåles.

- Hypertone/lokalirriterende stoffer (prolonterapi)

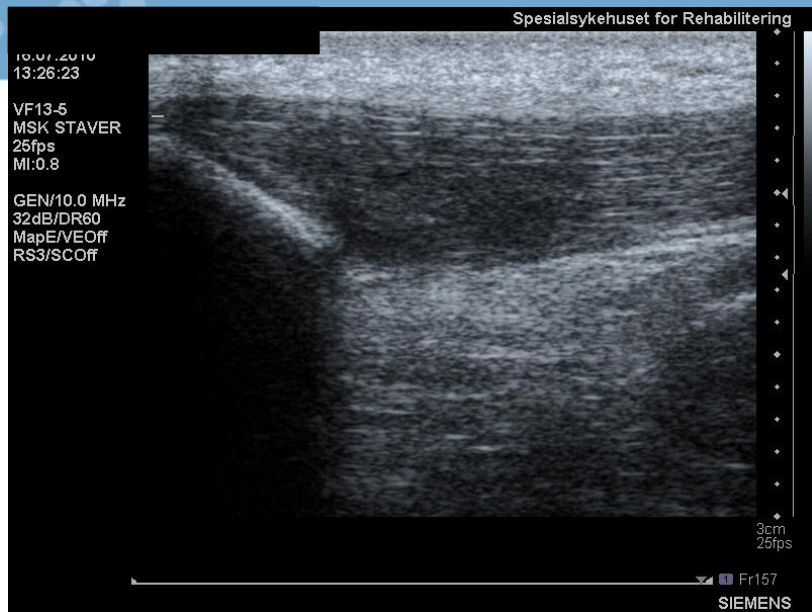
- Hva er det som foregår når det stikkes/needles?
 - Inflammatorisk respons?

Dry needling (patellarsene)

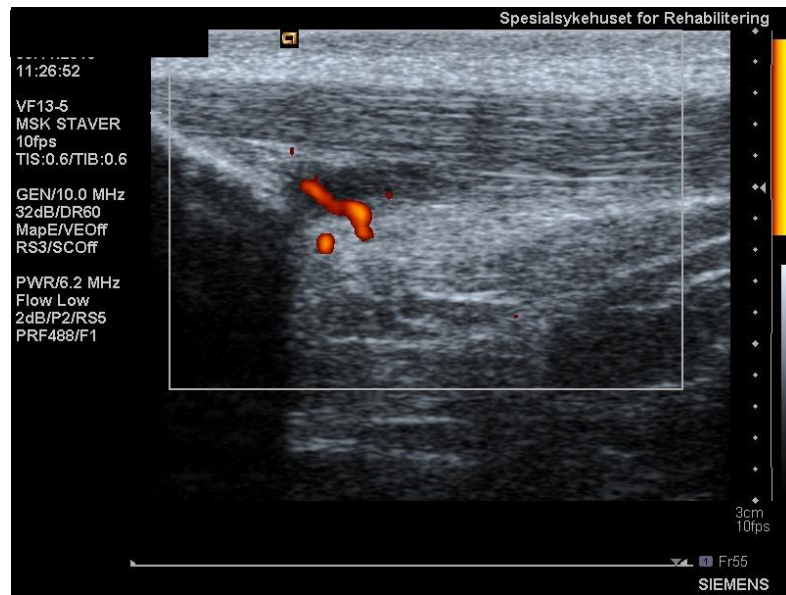
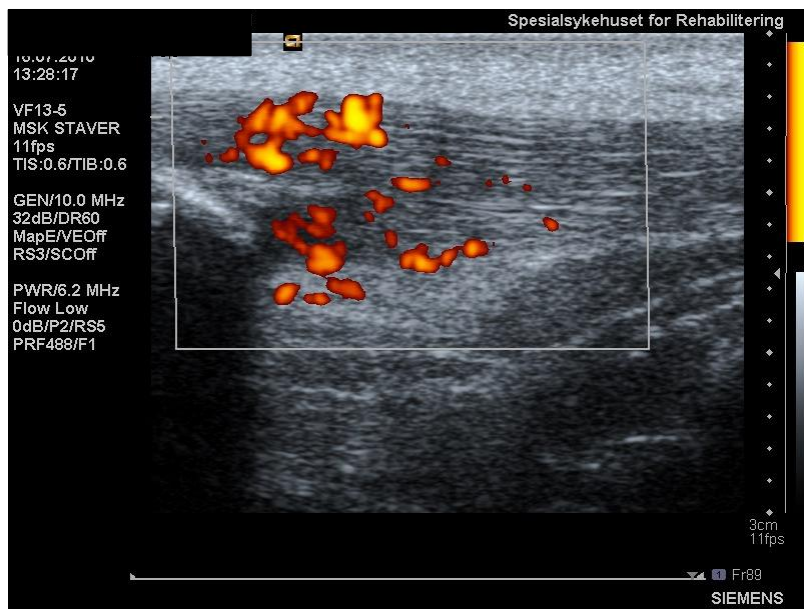
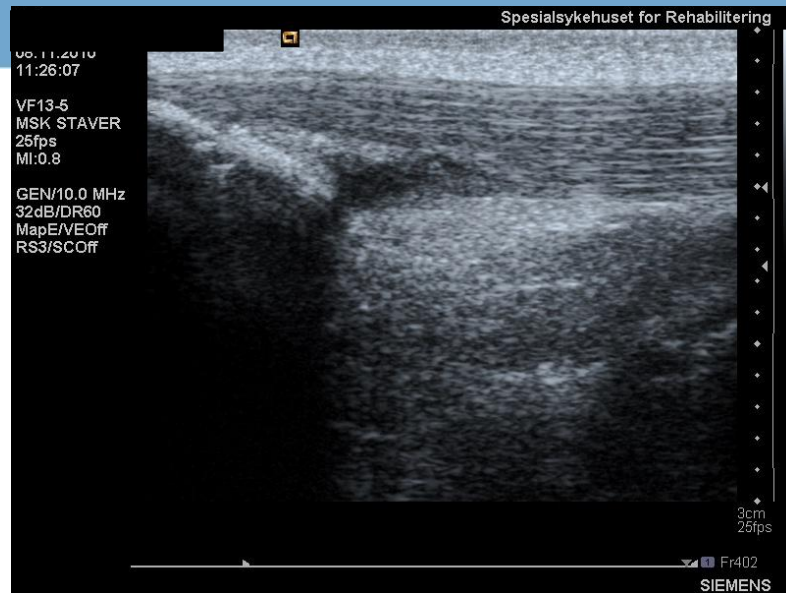
- Dry needling av tendinotisk senevev. Injeksjon 0,3 ml Kenacort i bakkant av senen, ved apex. Behandlingen gjentatt etter 4 uker.



Før



Etter



Sonographically guided percutaneous needle tenotomy for lateral elbow tendinosis

(Needling inkl. kortisoninjeksjon)

- “RESULTS: 55 of 58 patients were contacted by telephone and agreed to participate in the study. Thirty-five (63.6%) of 55 respondents reported excellent outcomes, 16.4% good, 7.3% fair, and 12.7% poor. The average follow-up time 28 months (range, 17-44 months). No adverse events were reported; 85.5% stated that they would refer a friend or close relative for the procedure”.
- “CONCLUSIONS: Sonographically guided percutaneous needle tenotomy for lateral elbow tendinosis is a safe, effective, and viable alternative for patients in whom all other nonsurgical treatments failed”.
- Tilsvarende studie uten kortison: ditto

- **Ultrasound guided dry needling and autologous blood injeksjon for patellar tendinosis**
- 47 knær, 44 pas
- Oppfølging 14 mnd
- Bedring fra 39,8 til 74,3 (VISA)
- Metoden brukes mye i Australia
- Blod eller needling?



D. Jonge (Nederland 2010):

- **The effect of platelet-rich plasma injection in chronic midportion achilles tendinopathy**
- 54 pas randomisert til PRP og placebo (saltvanninjeksjon , les: needling).
- Signifikant bedring i begge grupper etter 1 års oppfølging (PRP ikke signifikant bedre).
- PRP eller needling?

- Sjøkkbølgebehandling - ESWT – opprinnelig utviklet for behandling av nyre- og gallestein
 - Fokuserte bølger genereres via vann, kan penetrere dypt ned i vevet, energien konsentrert på et lite definert fokus med radius ca. 5 mm. Behandlingsområdet må identifiseres nøyaktig (rtg, UL). Dybde max 8 cm.
- Radial trykkbølgebehandling – rESWT – lavenergi sjøkkbølge
 - Ikke-fokuserte sjøkkbølger. Dannes via et stempelprosjekttil, overføres til vevet via en konveks applikator, bølgene spres radially/kjegleformet. Primært overfladiske tilstander behandles. Energi avtar med avstand.



ESWT...

- Biologisk effekt usikker.
 - Sjokkbølger -> knuse kalkdannelse
 - Aktivering av nociseptorer blokkeres, bedøvende effekt?
 - Økning av neovaskularisering, bedring av vevsregenerering?
 - Ekstracellulær og intracellulær påvirkning?
 - Hematom og fokal celledød -> ny vevsdanning?



ESWT - tennis elbow

- **UpToDate**

- **Extracorporeal shock wave therapy (ESWT)** — Acoustic waves have been used to treat chronic lateral elbow tendinosis. Overall, evidence supporting ESWT is unconvincing and we do not recommend it. The procedure is generally uncomfortable and although studies exist that suggest ESWT provides some benefit several studies have failed to do so.

Shock wave therapy for Achilles tendinopathy

- Clearly, more clinical trials are needed to evaluate the efficacy of SWT for Achilles tendinopathy.
- In the Cochrane review, only nine clinical trials for a total of 697 patients were of sufficient quality to be considered. This was a review of all treatments of Achilles tendinopathy not only ESWT.
- Studies comparing high energy, single-treatment protocols with low energy, multiple-treatment protocols, and studies comparing various dosing intervals and energy flux densities are also needed to determine optimal treatment parameters. A standardized method to evaluate results may also be helpful.
- However, it does appear that ESWT is a reasonable adjunct to therapy when conservative treatment fails.

Kirurgi

- Cochrane Database Syst Rev. 2011
- [Buchbinder R, et al](#): **Surgery for lateral elbow pain.**
- AUTHORS' CONCLUSIONS: Due to a small number of studies, large heterogeneity in interventions across trials, small sample sizes and poor reporting of outcomes, there was insufficient evidence to support or refute the effectiveness of surgery for lateral elbow pain. Further well-designed randomised controlled trials and development of standard outcome measures are needed.

