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Radiographic evaluation of the donor site after anterior cruciate ligament reconstruction with quadriceps tendon bone by T2 mapping MRI

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Disclosures:

The authors have no conflicts of interest directly relevant to the content of this presentation

Background ; graft

- ✓ Graft choice for ACL reconstruction

  STG/BPTB/QTB

Diermeier T et al, KSSTA ,2020

- ✓ QTB compared to BPTB

  Thicker graft/Higher load to failure (QTB;2186N BPTB;1581N)

Mouarbes D et al, AJSM,2019

↕

a case report of rupture at the QTB donor site

Pandey V et al, BMJ Case Rep. 2015

- ✓ There are some reports about evaluation of healing process of donor site

Although

These reports evaluated **only morphological change**

J.Kartis er al, KSSTA, 1999

E.Nakamura et al, Arthroscopy,2004

S.Lee et al, JBJS, 2007

Background ; T2 mapping MRI

New MRI technique

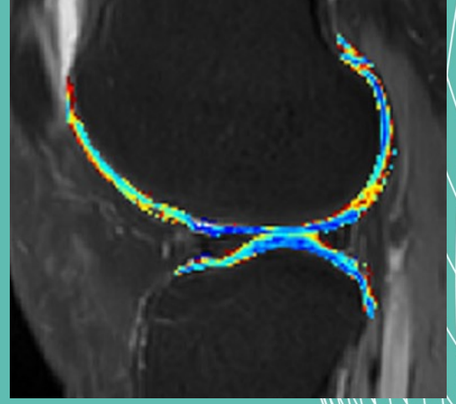
✓ Cartilage

✓ Tendon healing

after Rabbit achilles tendon rupture

after arthroscopic rotator cuff tear

There was **NO** date of the donor site after ACLR



Zhu J. et al, Skeletal Radiology,2019

Fukawa T. et al, radiology,2015

Xie Y et al, KSSTA. 2021

How to heal the QT after harvesting QTB??

objective

✓To assess donor site tendon healing with quantitative MRI T2 mapping after ACL reconstruction with QTB

✓To evaluate the correlations between T2 mapping-based tendon healing and clinical outcomes in the first year after ACLR

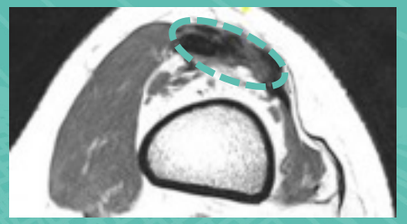
Patients

22 patients who undergo ACLR with **QTB** at our hospital between 2018 and 2020 were involved in this study

a single sports medicine orthopedic surgeon performed all surgeries

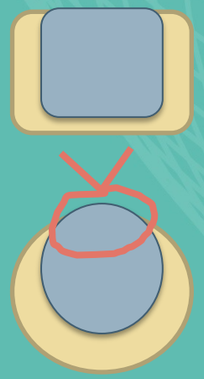
Sex	Male; 12 Female; 10
Mean follow-up period	23±6.7 months
Mean age at the operation	24.4±10.5 months
Height	165±7.7 cm
Weight	64±13 kg
Tegner activity scale	6.3±1.1
KT @ final follow up	0.78±1.0 mm

Surgical technique

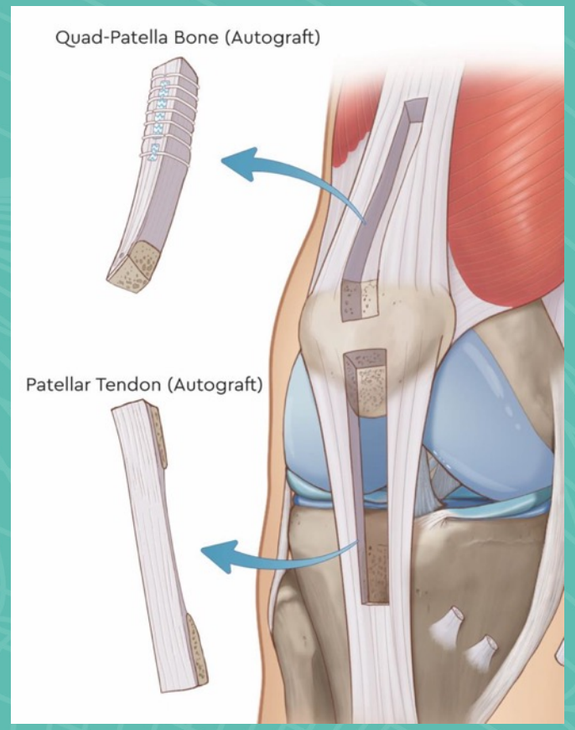


lateral medial

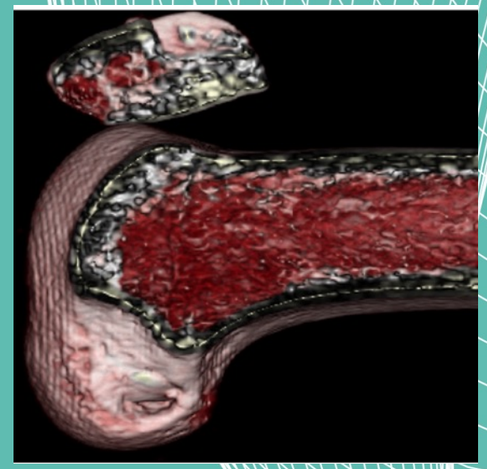
Harvest from central (slightly medial)

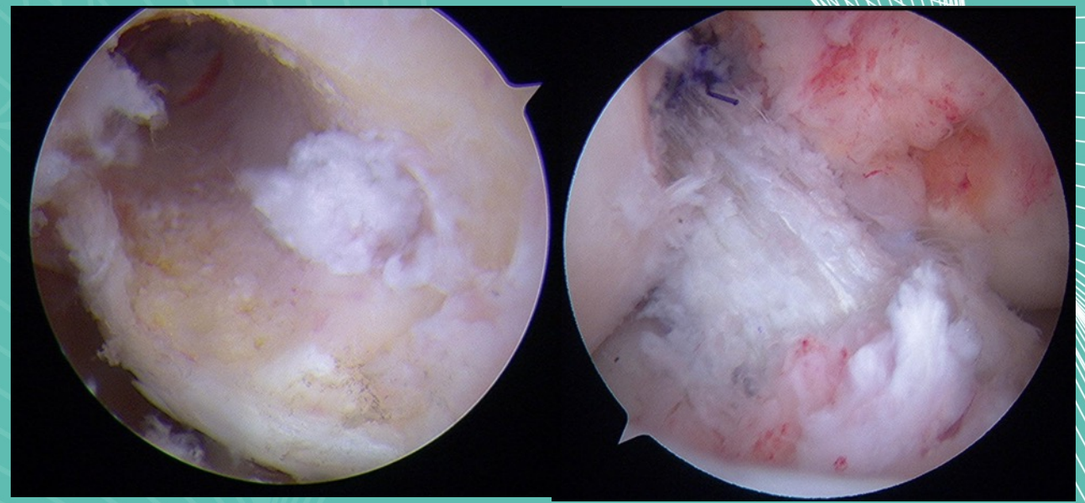


Suture the
surface layer
end to end



Transtibial technique

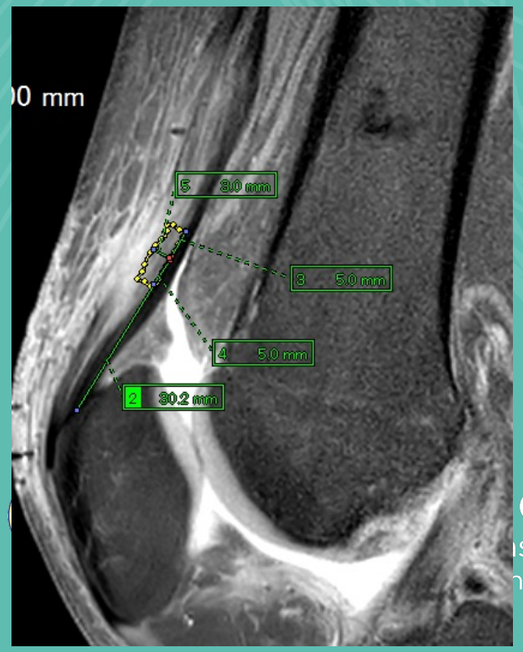




Clinical evaluation and Radiographic assessment

Postoperatively @3,6,12 months

- ✓ T2 mapping MRI / Clinical score / Complications; ACL re-tear, donor site rupture
  - ➢ Donor site morbidity score(symptom related to donor site)
    S. Aufwerber et al. , KSSTA, 2012
  - ➢ Anterior knee pain score (;AKP score)
  - ➢ Lysholm score

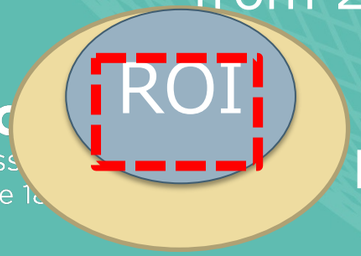


ROI of donor site;

By saggital image

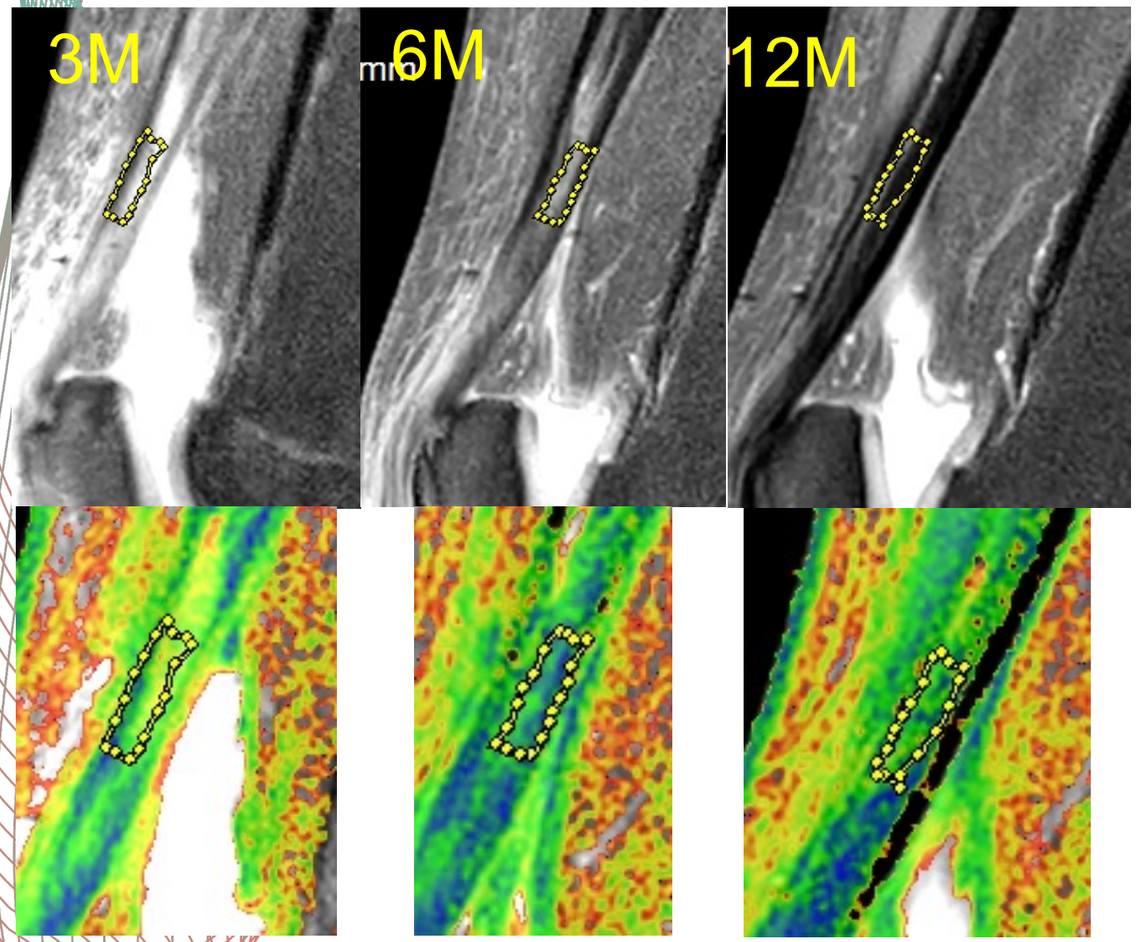
defined as 1cm in width 3 mm in depth

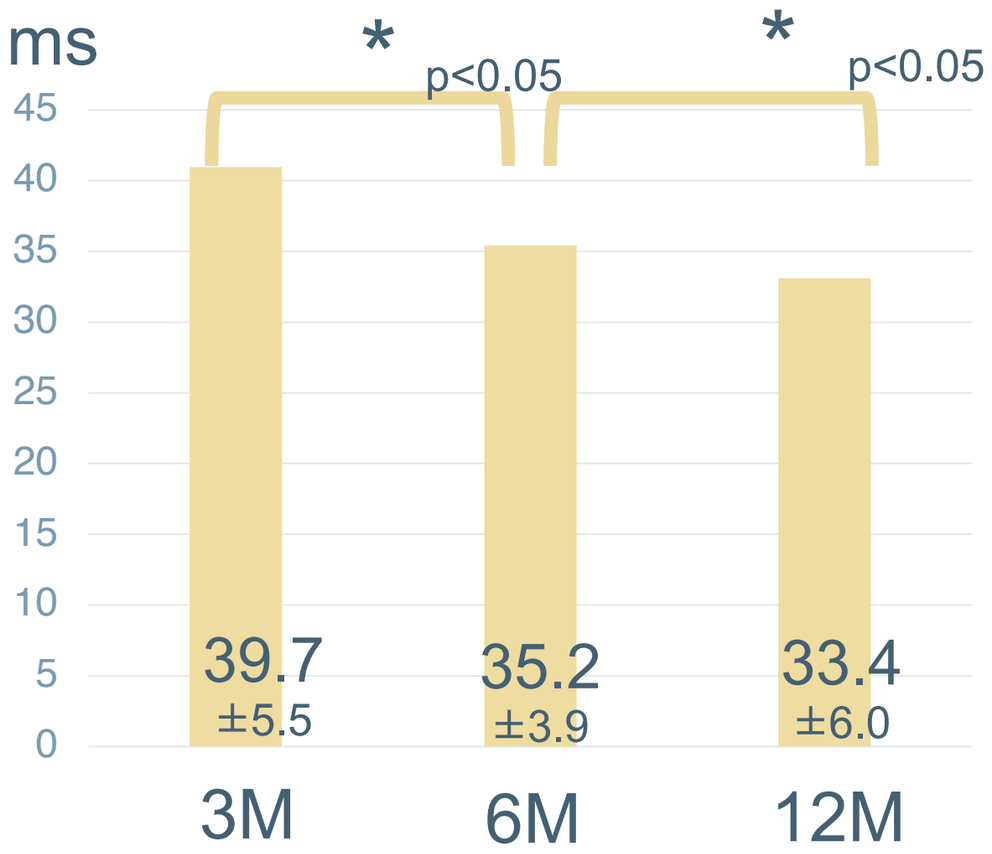
from 2.5cm to 3.5 cm proximal to the superior pole of the patella



ROI was set in the void after harvested

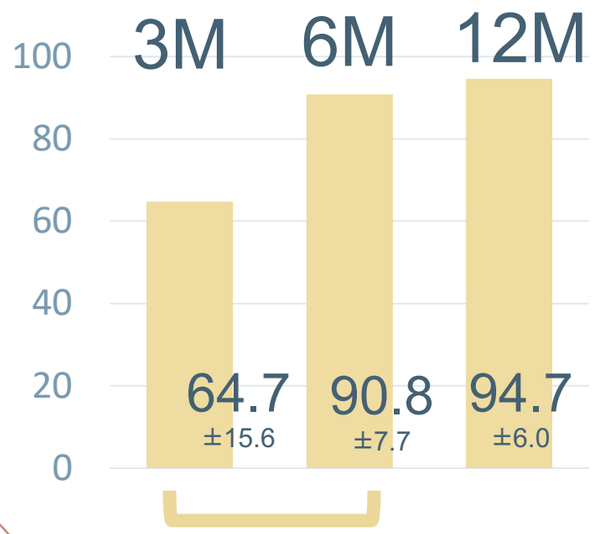
Results; T2 value





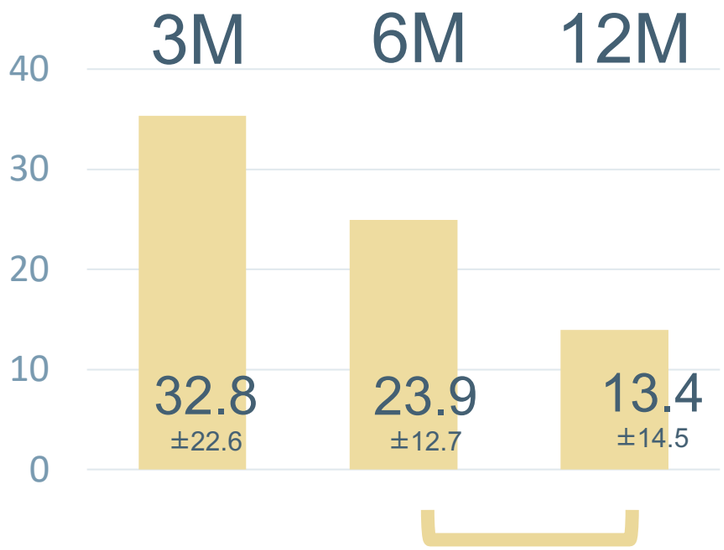
Results; Clinical evaluation

Lysholm score



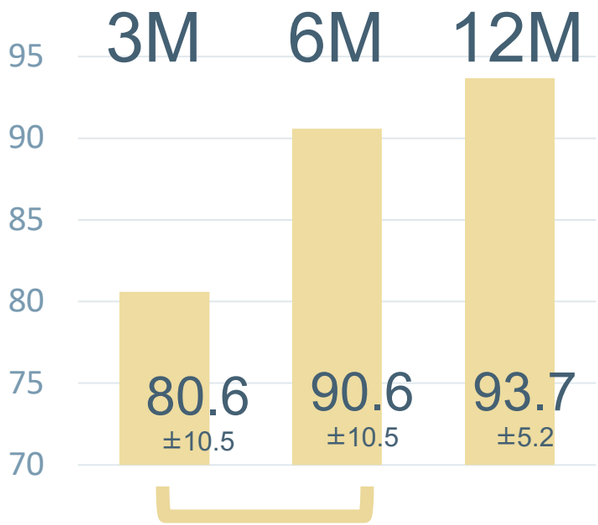
* p<0.05

Donor site morbidity score



* p<0.05

AKP score



* p<0.05

Each scores were gradually **improved** over time

Man Whiteny U test

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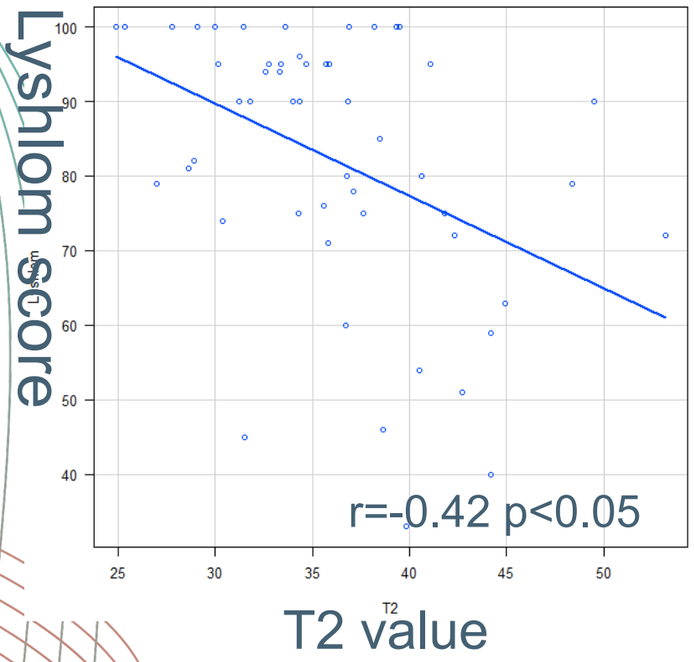
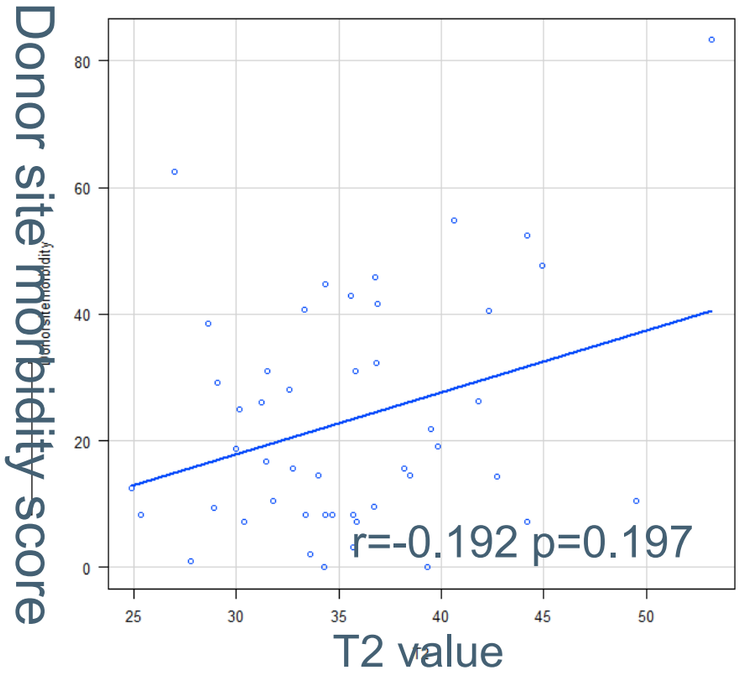
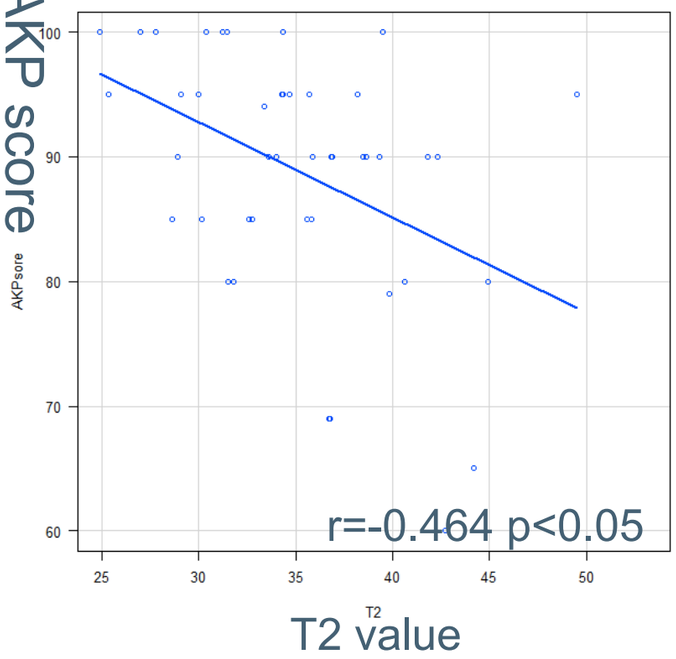
*there was no ACL-retear and donor site rupture

Results;
Correlation between T2 values and clinical score







negative correlation between **AKP score** and T2 values and between **Lyshlom score** and T2 values

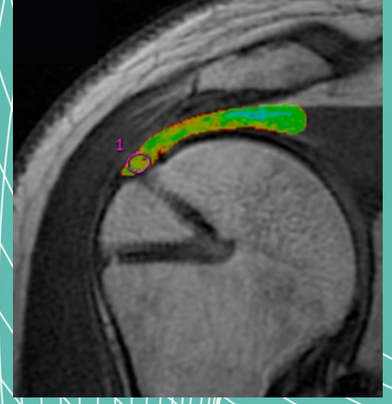
Spearman's correlation coefficient

Discussion

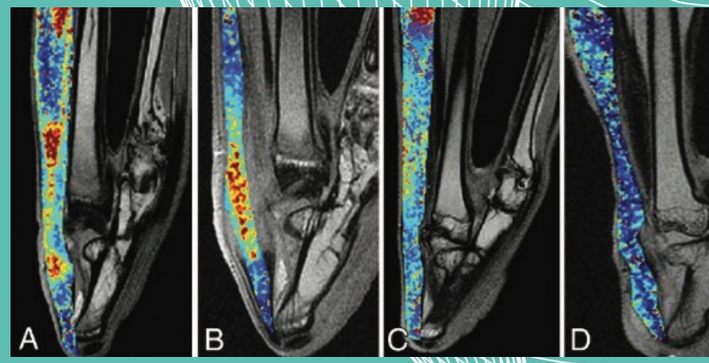
Relationship between **T2 value** and tendon healing

- ✓ After ARCR
  - ➢ gradually **decreased @12months (≒healthy controls)**
- ✓ After **rabbit** achilless tendon rupture
  - ➢ **decreased@12 weeks(≒ healthy controls)**
  - ➢ **histologic tendon healing** were **correlated**

Decrease of T2 value correlates with **tendon healing**



Xie Y et al, KSSTA. 2021



Fukawa T. et al, radiology,2015

In our study;

➢ Gradually **decreased** over time

→donor site was healed over time

Factors related to clinical scores after ACLR

Muscle strength / Anterolateral rotatory laxity / Age / ICRS grade / Concomitant meniscal lesion

Flosadottir V et al, BMC Musculoskeletal Disordars. 2018
King E et al, AJSM. 2020
Getgood A. et al, AJSM. 2020

- **In our study**

Improvement of clinical scores

correlates with decrease of **donor site** T2 values

- ✓ After ARCR
  - ➢ **Decrease of T2 values** correlates with **clinical score improvement**
- ✓ In our study
  - ➢ Decrease of T2 values correlates with **Lyshlom** and **AKP score** improvement

Donor site healing correlates with

✓ Improvement of **Knee function**

✓ Reducing of **Anterior Knee Pain**

Limitation

- ✓ Short follow up period
- ✓ Date measurement was done one examinar
- ✓ It was not evaluated preoperative T2 values at the donor site, so it was not unclear that the T2 values of the healthy QT

Conclusion

- ✓ T2 values of the donor site after ACLR with QTB were evaluated
- ✓ T2 value of the donor site were gradually decreased over time
- ✓ Decrease of the T2 values at the donor site correlates with the clinical scores