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Hôpitaux de Lyon



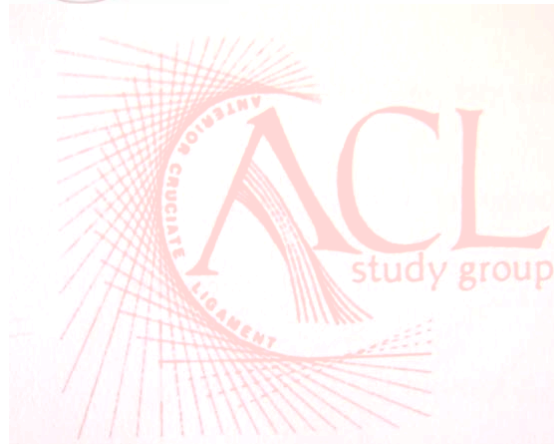
Graft Choice in Revision ACL

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The authors of the next presentation have identified no following potential conflicts of interest



a complete warm-up programme

11+



LYON GENOU

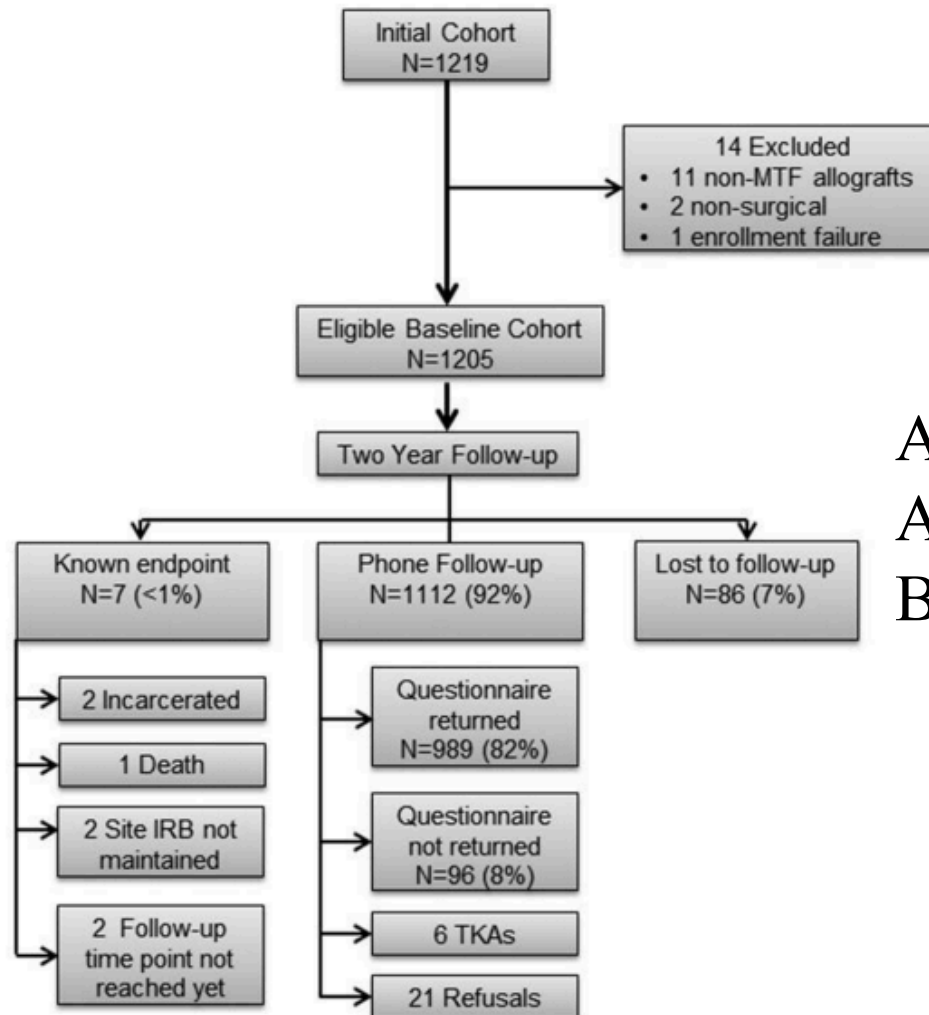


CENTRE ALBERT TRILLAT

UNIVERSITY TEACHING CENTER



Effect of graft choice on the outcome of R.ACLR in Mars Cohort



	37 / 1112
	Reruptures
Autograft 48%	12
Allograft 48%	24
Both types 3%	1

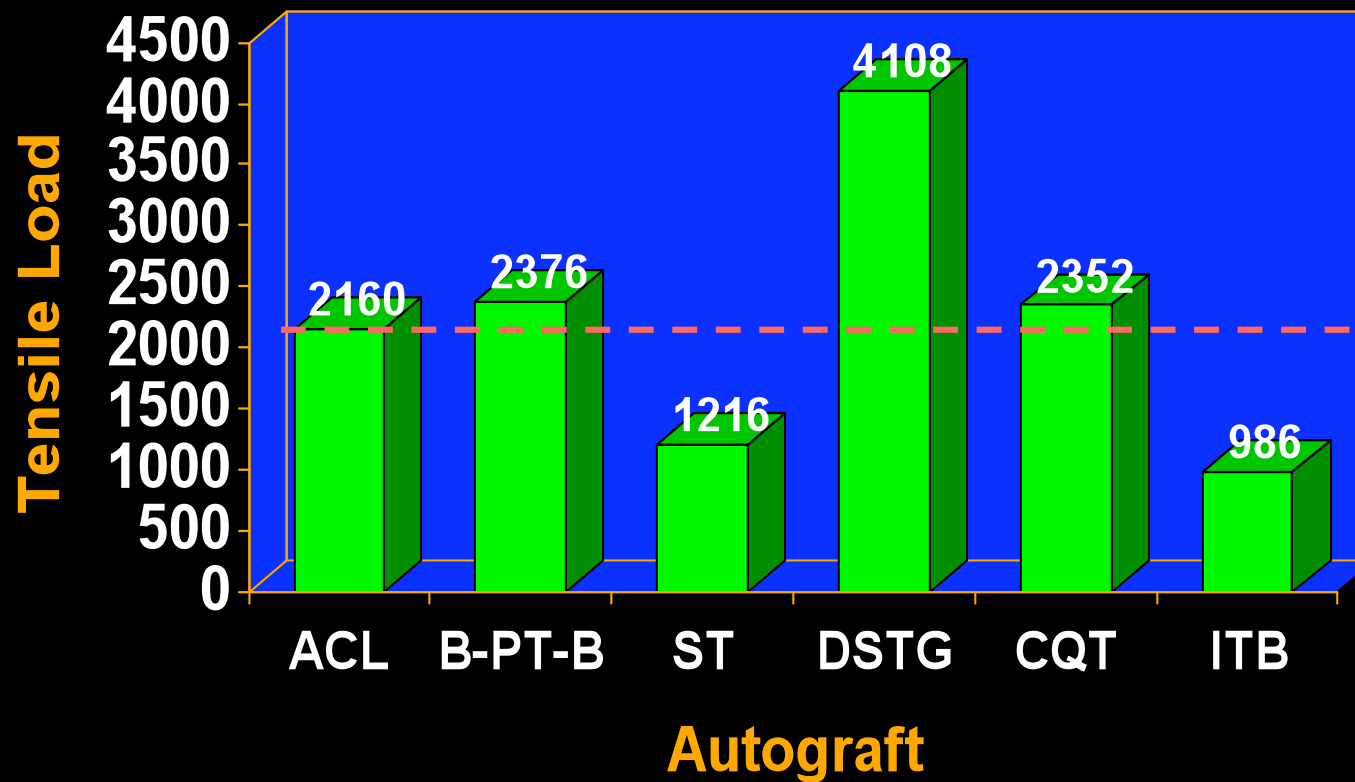
Effect of graft choice on the outcome of R.ACLR in Mars Cohort

- Improved sports function and PRO measures are obtained when an autograft is used.
- Additionally use of an autograft shows a decreased risk in graft rerupture at 2y FU
- No differences were noted in rerupture or PRO between soft tissue and B-PT-B grafts.

Factors to Consider

- Initial Biomechanical Properties
- Initial Fixation Strength
- Fixation Site Healing
- Biological Incorporation
- Donor Site Morbidity

Autograft Strength



Courtesy of Dan Wascher

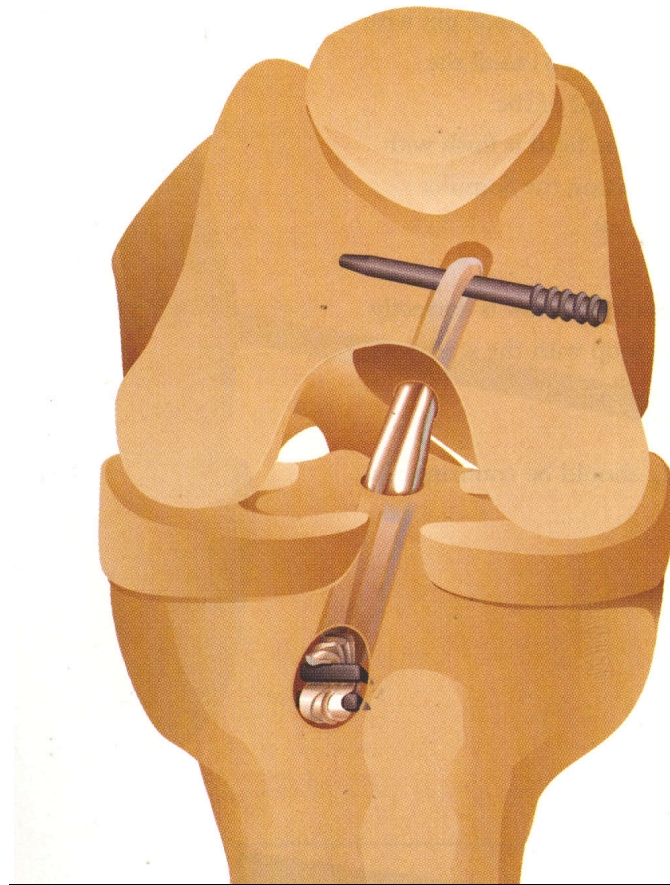
Initial Fixation Strength

- Femoral Cross Pin
- Interference Screw

Bone

Soft Tissue

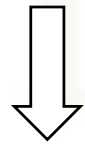
- Endobutton
- Screw-Washer
- Suture-Post



Courtesy of Dan Wascher

Fixation Site Healing

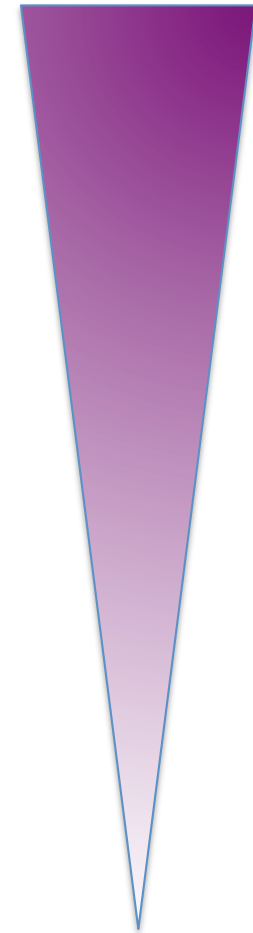
Bone to Bone



Tendon to Bone



Allograft



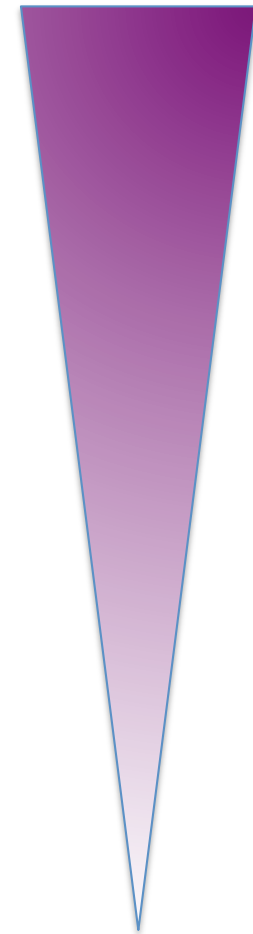
Donor Site Morbidity

Allograft – Xenograft – Synthetic

DSGT

Central Quad Tendon

1/3 Patellar Tendon



Courtesy of Dan Wascher

Intraarticular Reconstruction

Anatomic Placement Of Graft Material

To Substitute For Torn ACL

Ideal ACLR Graft

- Reproduces fibers anatomy
- Equal final biomechanical properties
- Rapid biologic incorporation
- Strong initial fixation
- Easily harvested
- No donor site morbidity
- High level of safety
- Minimal failure rate

Does not
exist !!

Graft options

- Autograft
- 1/3 Patellar Tendon
- Doubled Semitendinosus-Gracilis
- Central Quadriceps Tendon
- Allograft
- Xenograft
- Synthetic Grafts

Contralateral Graft

Advantages

Less Morbidity to.....
Injured Knee.....

Flexible Graft Options.....

Easier Rehab and Quicker.....
Return

Shelbourne, AJSM 2000

Disadvantages

Graft Morbidity Shifted
to “Virgin” Knee

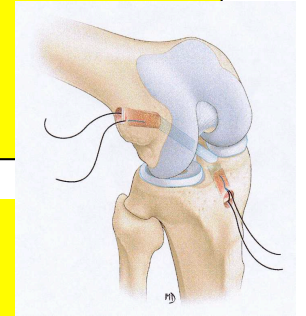
Risks = Ipsilateral

No Advantage

Mastrokolos, AJSM 2005

Ipsilateral already harvested
BPTP possible after 18 months but...

Bone-Patellar Tendon-Bone

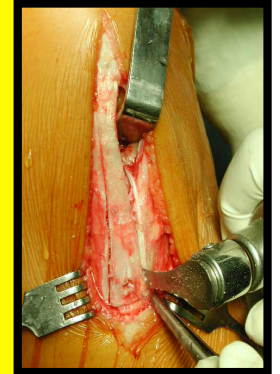


- Lamda in 1937. Jones 1963. Franke 1976`favorable long term Fu success rates as well as early return in sporting activities
- Bone plugs in both ends facilitate graft fixation and osteointegration (important factor in healing process and rehabilitation explaining its selection in elite patient)
- Possible pressfit fixation



Bone-Patellar Tendon-Bone

- Possibility to assess graft size via MRI
- Less postoperative side-to-side knee joint laxity (vs HT)?
- At 15 y more general knee pain and kneeling pain quadriceps weakness potential patella fracture and risk of patellar tendon rupture
- Harvest site morbidity is an important consideration in patients with high demands on satisfactory kneeling abilities in sporting or occupational activities



Bone-Patellar Tendon-Bone




- Cannot be used for a double ACLR
- Higher risk of osteoarthritis (vs HT)
- Consequently BPTP autograft has lost its position as preferred graft choice in Primary ACLR and is now considered secondary to the HT autograft.



2 bone blocks in RACLR



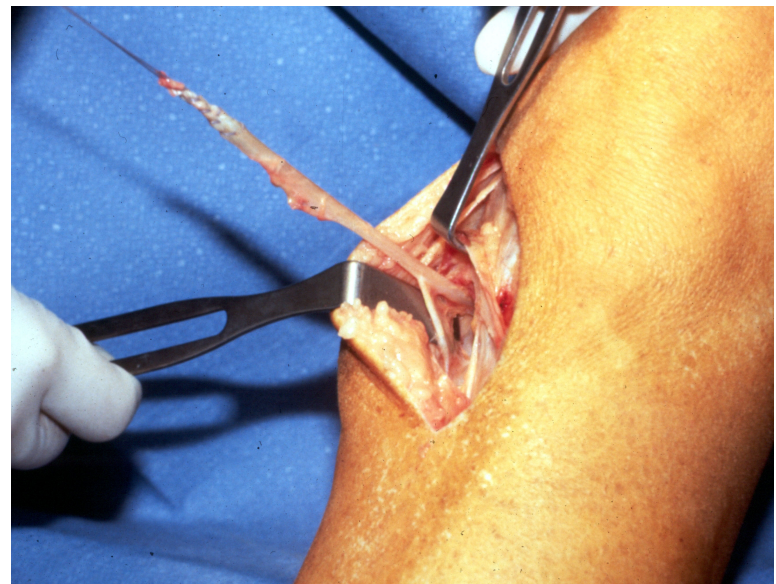
Hamstring Tendon

- 98% in Sweden, 44% in USA primary in ACL
- Less donor site morbidity than BPTB autograft
- Stronger and stiffer than BPTB 
- Versatility in both single and double bundle
- Longer healing time compared with BPTB fixation (even if it does not affect post-operative knee laxity) 
- Bone tunnel widening (unclear clinical importance) 

Hamstring Tendon

- Weakness in deep knee flexion and internal rotation (it disappears over time except if Gracilis is also harvested-SGT-)

? Except if posterolat. lesion



PT versus HT

- In 2011 Mohtadi & al Cochrane review
- 19 (quasi) randomized trials diectly comparing the outcomes of PT and HT autograft ACLR
- 1748 patients (21.5 to 32Y)
- No Difference in
 - Functional outcomes(hop test)
 - Activity participation (Tegner, Lysholm)
 - Rerupture Rate (2.6% PT vs 3.3% HT)

PT versus HT

- In 2011 Mohtadi & al Cochrane review
- PT autograft associated with
 - More stability (KT1000, LT, Pivot shift)
 - Extension deficit
- HT Autograft associated with
 - Flexion deficit

The authors deemed there is **insufficient evidence** to provide a clinical recommendation for either type of graft

So in RACLR ??

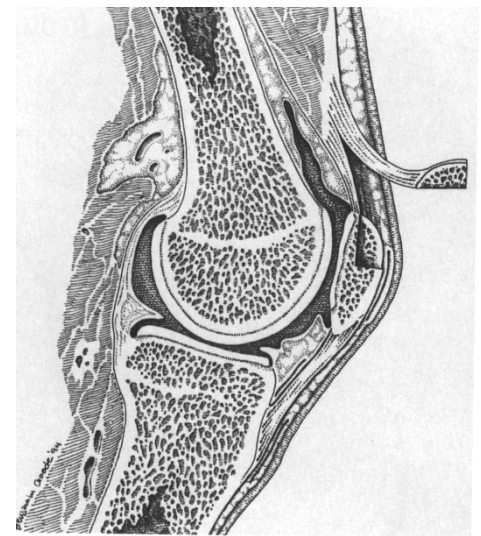
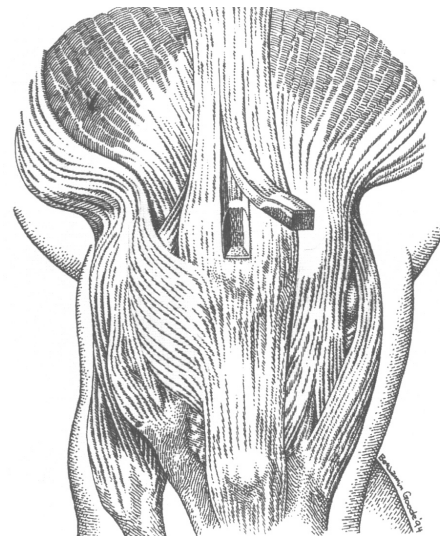
The Quadriceps Tendon autograft

- Many advantages , few complications
- Underestimated resource
(Stäubli, Blauth 1984, Fulkerson & Langeland 1995)
- Bone attachment possibilities (with or without bone block)
- Twice the thicker than BPTB autograft
- Cross sectional area is considerably larger
- Rectus femoris and vastus intermedius portions enables single and double reconstruction
- Less anterior knee pain and numbness (vs BPTB)



The Quadriceps Tendon autograft

- The large cross sectional area has be proven to an excellent aid in patients undergoing **revision surgery** who might have **enlarged bone tunnels**.



Allografts

- Patellar tendon, Achilles tendon and the tibialis anterior
- Shortened operating time
- No harvest-site morbidity
- In the past potential disease transmission and low availability
- Today **improved sterilization technique** and increased supply to accommodate to growing demand



Allografts

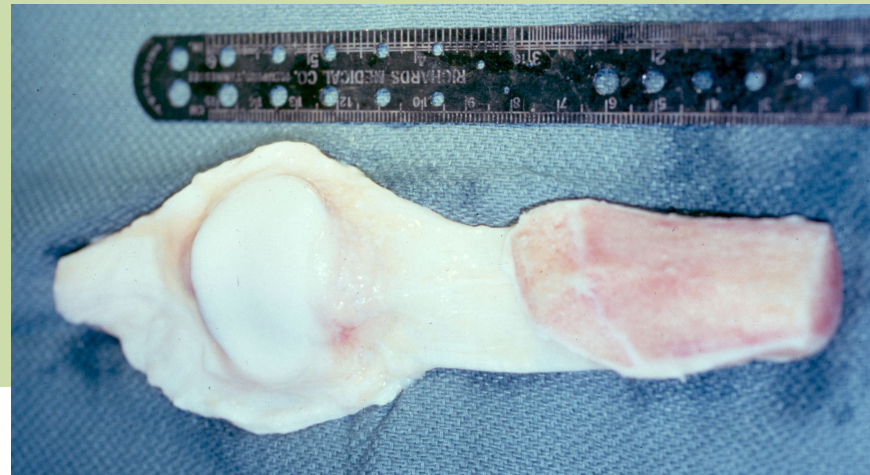
- Unfortunately prolonged healing time
- Interface allograft-bone will not be as competent as autograft-bone alternative
- Increased risk of graft failure

However useful in revision surgery, elderly patients, injuries with multiple ligament involvement

Allografts

- Although irradiated allograft have demonstrated higher rates of failure compared to autografts, **Non-irradiated allografts** have shown more promise (Borchers & al 2009, Mariscalco & al 2013).

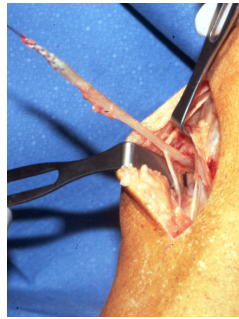
Allografts hold a promising future





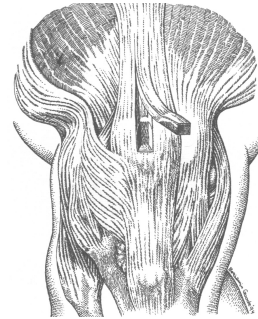
PT

Age 16 – 30
Male
Sprint Sports



HT

Age > 30 or
Female
Jumper
Kneeler
Open Physes




QT

Male
Kneeling



AlloG

Revision
Multi-lig
↓  Donor
site

ContraL

Revision

Quick Recovery

Multi-ligt

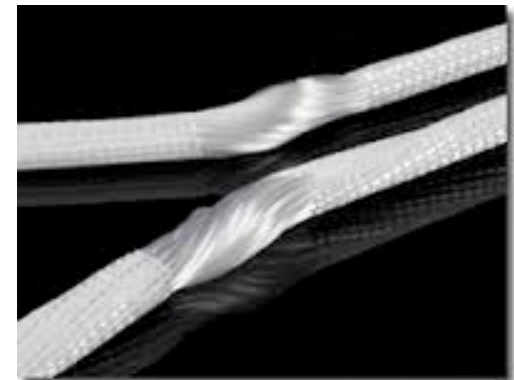
Xeno

Not Yet



Synthetic

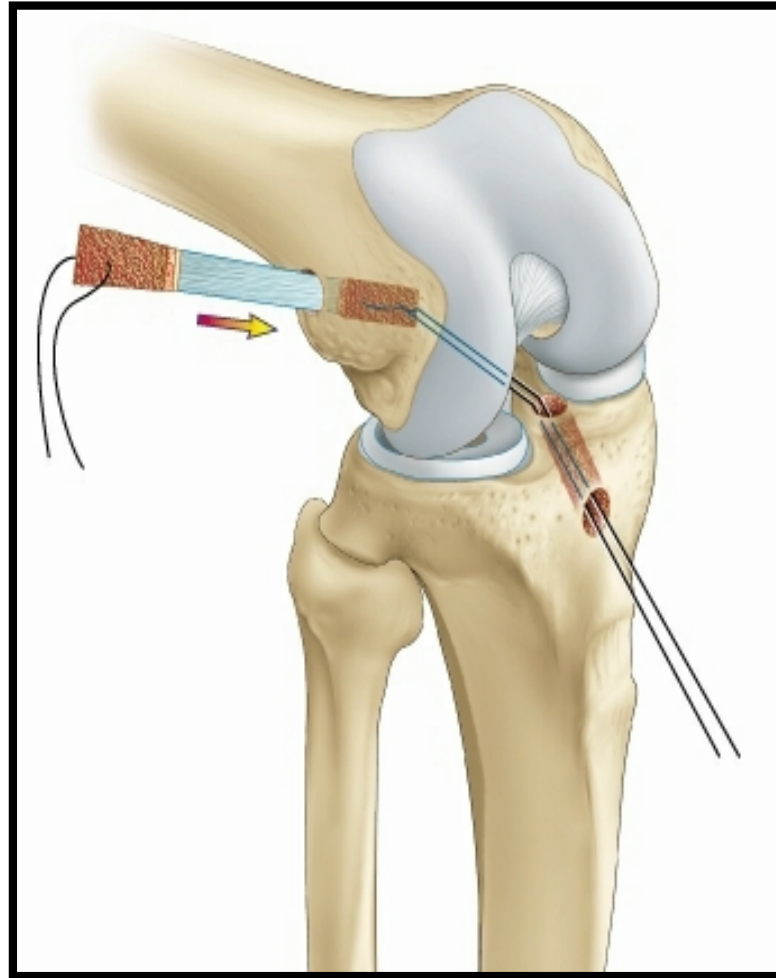
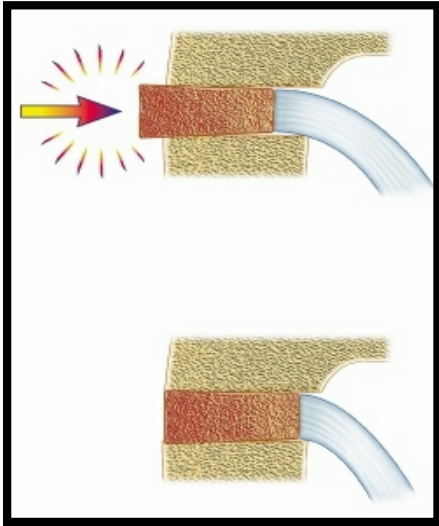
Not Yet



In Practice

In Primary ACLR Graft Selection is Based on Patient Factors And Desires

In R.ACLR Graft Selection also Depends on Previous Surgery and Anatomical Circumstances



Optimal graft selection

- A debate persistent through the last decade
- Different grafts merely represent different characteristics and mechanical properties
- No clinically relevant differences between the two main competitors the BPTB autograft and the HT autograft.
- In conclusion both BPTB autograft and HT autograft are viable option for ACLR with equal long term outcome

Conclusion

Current evidence does not substantiate the use of one graft type over the other, both among autograft and when comparing autograft to non irradiated allograft.

LEVEL 5 - PROBABILISATION CRITIQUE

