




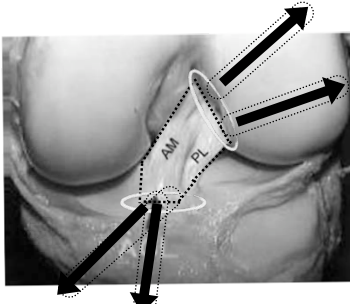
Double-bundle reconstruction : pitfalls, traps and solutions

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What we need for a DB reconstruction ?



- ~ Graft
- ~ Right insertions sites
- ~ Good tunnels
- ~ Adequate fixation
- ~ Good healing process

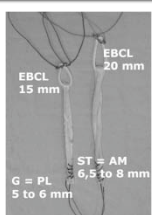
PITFALLS and TRAPS



- **Graft** : choice - size - setting - tensioning
- **Tunnel** : position - orientation - bone bridges
- **Fixation** : device - number - size - price
- **Positioning** : anatomic - landmarks - ckeck
- **Specific complications**
 - Cyclop
 - Tunnels Enlargment
 - Re-ruptures
 - Revision surgery

Graft choice

DB reconstruction requieres MORE graft (too short, too thin)



- Allograft : «best»-size option but ...
- Hamstrings : good option
- Quadiceps tendon : good option
- BTB tendon : recently described



Hamstring managment

Hamstrings
Agressive stripper
Reproducible technique

B. Sonnery-Cottet

Hamstring managment

Hamstrings


- Semi -Tendinosus :
AM graft X2-X3 : 7-9mm
- Gracilis :
PL graft X2-X3 : 6-7mm
- ... and we keep it attached

B. Sonnery-Cottet

Quadriceps Management

Quadriceps tendon

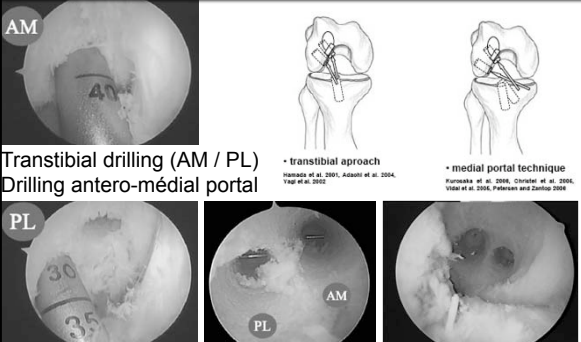
- One bone plug
- Tendon divided in two grafts (2 layers)
- ! «big» graft



Double blade surgical knife

B. Sonnery-Cottet

Tunnel size-direction-coalition



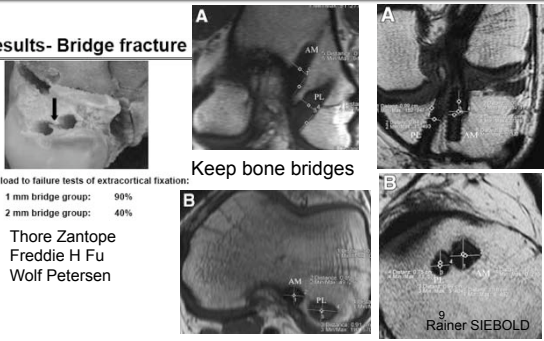
Transtibial drilling (AM / PL)
Drilling antero-médial portal

• transtibial aproach
Hasegawa et al. 2001, Adachi et al. 2004, Yagi et al. 2002

• medial portal technique
Furukawa et al. 2006, Christel et al. 2006, Vidal et al. 2006, Peterson and Tompog 2009

Tunnel size-direction-coalition

Results- Bridge fracture



Keep bone bridges

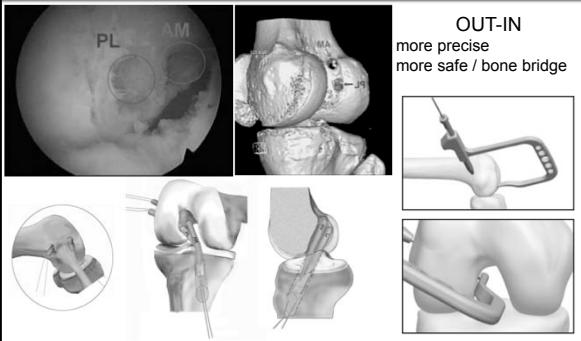
after load to failure tests of extracortical fixation:

1 mm bridge group:	90%
2 mm bridge group:	40%

Thore Zantope
Freddie H Fu
Wolf Petersen

Rainer SIEBOLD

Tunnel size-direction-coalition



OUT-IN
more precise
more safe / bone bridge


Tunnel enlargement

Observations on Bone Tunnel Enlargement After Double-Bundle Anterior Cruciate Ligament Reconstruction

Rainer Siebold, M.D.

Tibial: AM 7,4mm to 10,6mm
PL 6 mm to 8,9 mm

Femoral: AM 7,1mm to 9,7mm
PL 5,8mm to 8,5 mm



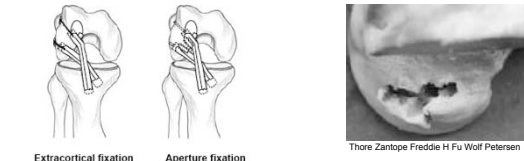
AM anterior
PL posterior

Graft Fixation

... back to the previous debates

Not always possible to use your favorite fixation device

Screws can damage the tunnels and break the bone bridges



Extracortical fixation Aperture fixation

Thore Zantope Freddie H Fu Wolf Petersen

Graft fixation : tensioning the graft

- Fix the PL bundle in EXTENSION (or close)
- otherwise ... to tight ... FLESSUM

– The PLB is loaded to greater degrees than the AMB in the range of less than 30 degrees

(Yagi, Woo, et al: AJSM, 2002)

Extension	AM bundle graft (N)	PL bundle graft (N)
Full Extension	~100	~100
30	~80	~100
60	~60	~100
90	~40	~100

Graft Placement

I need to see this ...

...I see that

How to figure out the position ?

Yasuda 2000

At 90° of knee flexion, keeping the femur horizontal

0° Anatomic

90° Arthrostress

135° dorsal decubitus

How to figure out the position ?

Standard antero-lateral portal view

Anatomic view

Antero-medial portal view

100% superior

0% shallow

100% deep

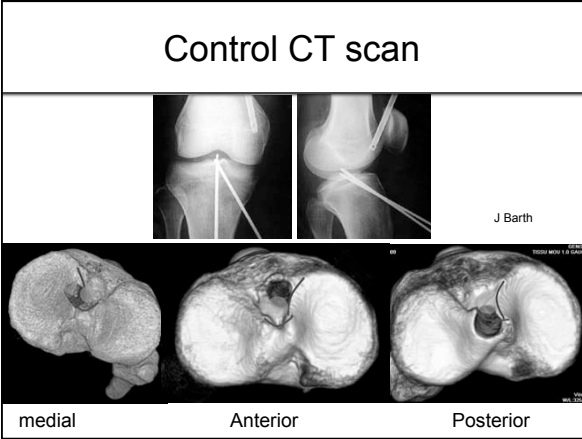
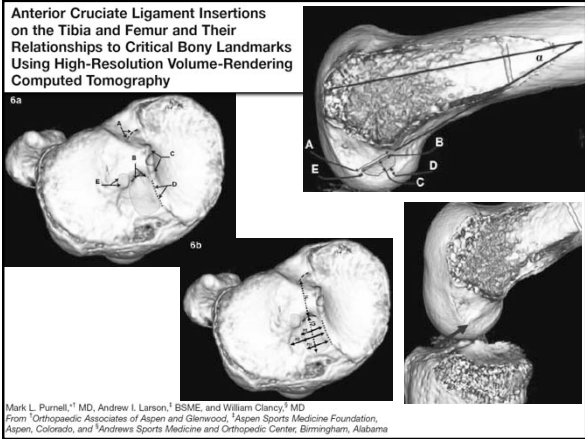
0% inferior

Navigation system

Define the anatomical insertion areas

Controle CT scan

J Barth

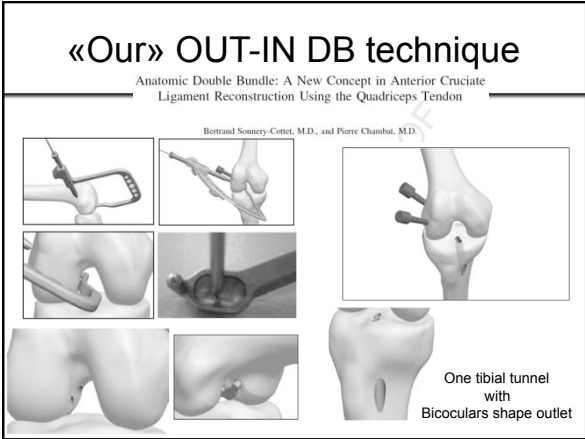


«Simple» double

- Allograft
- Over the top AM - tibial drilling
- «As you want» PL - AM portal drilling
- First femoral fixations and simultaneous tibial fixation on the tibial cortex (same angle and tension)
- ...

«Complex» double

- Autograft (with hamstrings, Quad tendon, BTB)
- Anatomic ACL placement
- Two real different tunnels in the Tibia
- In all knees (small bones)
- Navigation system ?
- ...



«Our» complication in DB technique

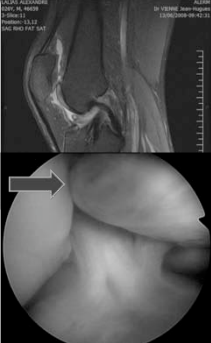
Specific complications

- Cyclop
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Complications : Cyclops

- Series : 4/54 = 7%
- All DB 2006-2007: 16/387 = 4%
- QT 12: 7% ; Hamstring 4: 2%
- Graft size / knee size?

Always from the ROOF



Our advice for the Graft management

- Hamstrings probably easier to get 2 grafts
- Fix the PL bundle with the knee in full extension
- Avoid «big» grafts → Flessum
- ACL «away» from PCL → proper anatomical placement (impingement)
- Think to the «hanged up» cyclop

Our advice for the tunnel placement

- «re»-learn the anatomy
- control your anatomical placement results (CT-scan)
- Consider the OUTSIDE-IN technique
- Respect the bony landmarks
- Stay aware about the navigation systems

Our advices for the postop care

- More bleeding ? → drain ?
- Pay more attention to extension recovery (knee flessum)
- Good opportunity to initiate a survey

Try to find an efficient technique

Try to find an efficient technique

Thank You !