Université Claude Bernard Lyon 1

COMMON ERRORS IN ACL SURGERY
Tunnel position

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ESSKA 2016

Hôpitaux de Lyon

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Hôpitaux de Lyon

CONFLICT OF INTEREST

Smith & Nephew

FEMORAL TUNNEL

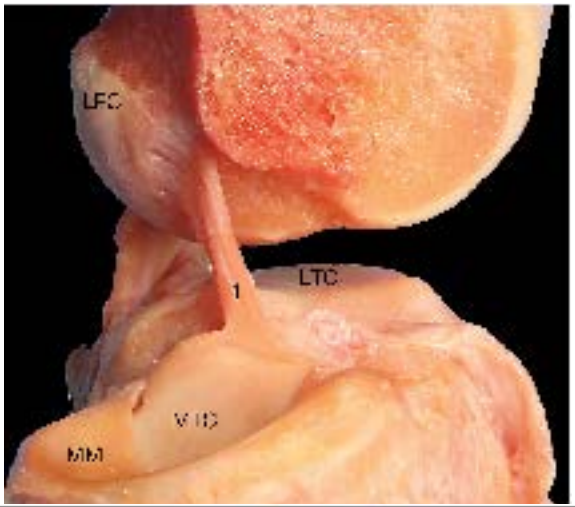
Most common error !

too anterior

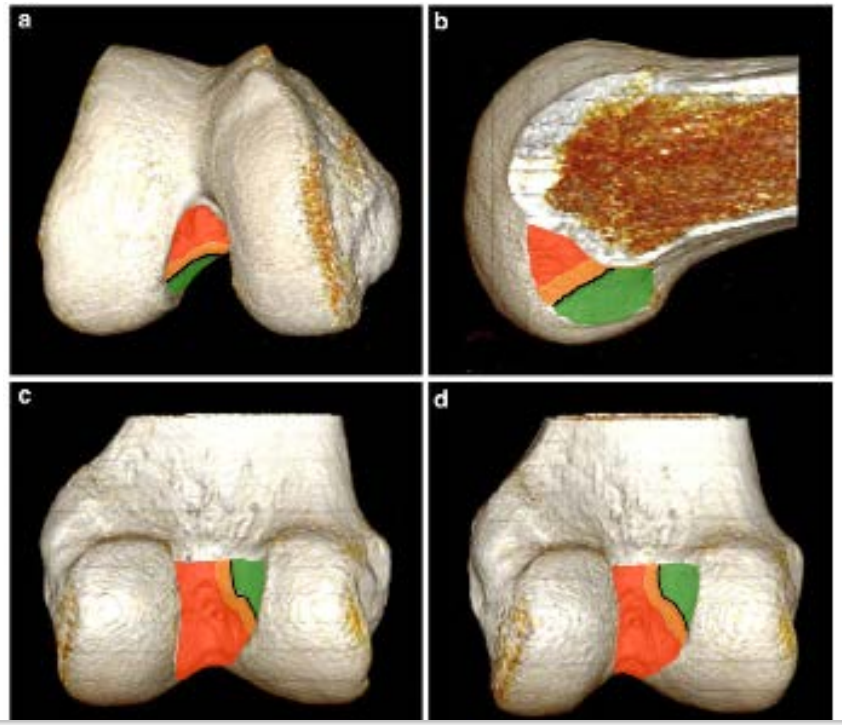
Femoral tunnel malposition

- 1st cause for ACL failure & revision
- X-rays irrelevant for
  - Intra articular positioning
  - Tunnel direction (frontal & saggital plane)

Pictures from Smiglieski



FEMORAL TUNNEL



Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-011-1814-4

KNEE

A CT-based classification of prior ACL femoral tunnel location for planning revision ACL surgery

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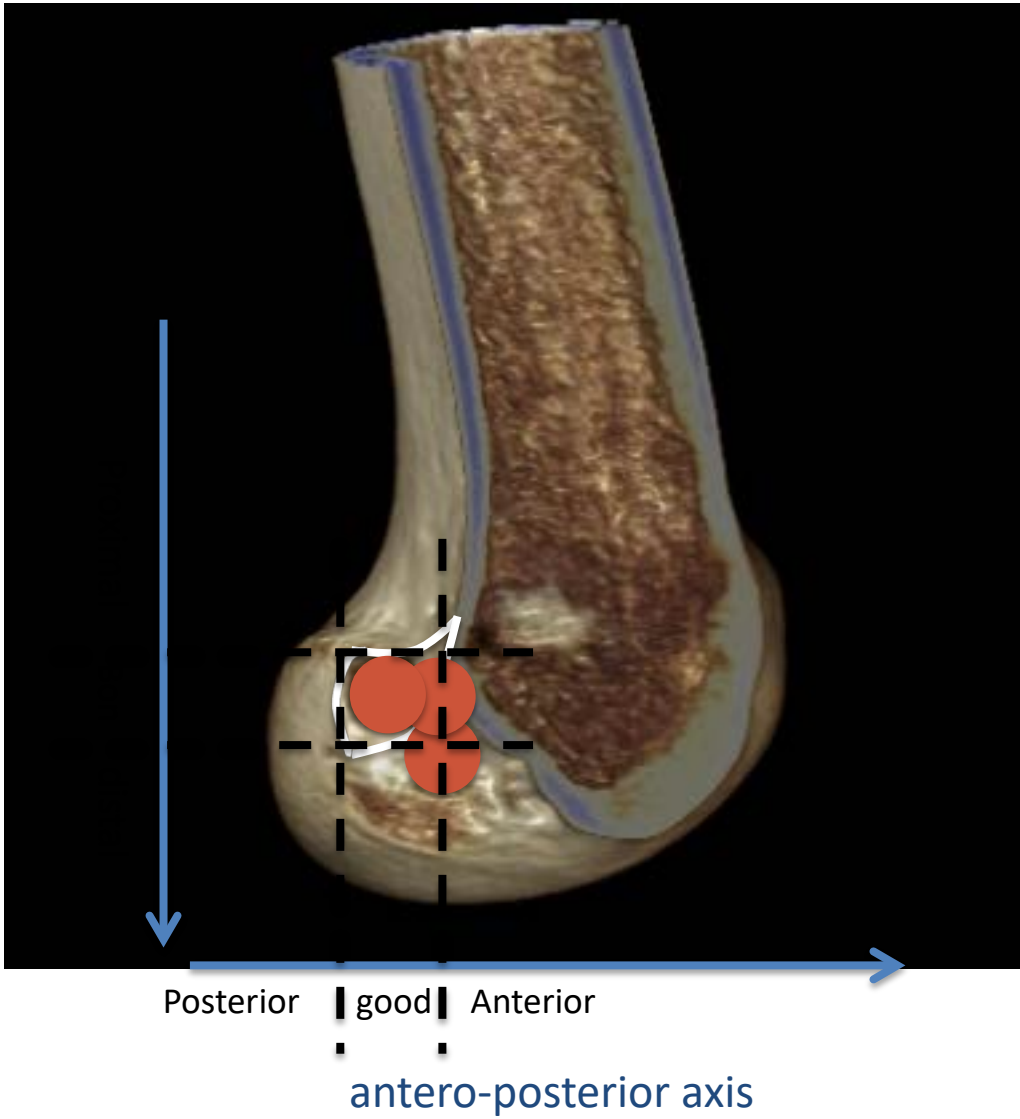
Biju Benjamin · Sébastien Lustig · Guillaume Demey ·
Elvire Servien · Philippe Neyret

FEMORAL TUNNEL

- Position depends
  - on technique
  - portal view
  - knee flexion
- ACL anatomy



FEMORAL TUNNEL

- Transtibial technique

  Femoral tunnel drilled through the tibial tunnel with the knee flexed about 70-80°

  Femoral positioning constrained by the tibial tunnel position and angulation

FEMORAL TUNNEL

- Transtibial technique

➡ inconsistent anatomic graft placement

➡ femoral tunnel too vertical

(often in the roof and not in the wall of the notch)

FEMORAL TUNNEL

- AM portal technique

- Independent drilling of femoral tunnel

- Mark femoral location and drill at 120° of knee flexion

- Risk to blow the posterior cortex

FEMORAL TUNNEL

- AM portal technique

  ➡ Limited visibility

  Better visibility using flexible drill and drill at 90° of flexion ?

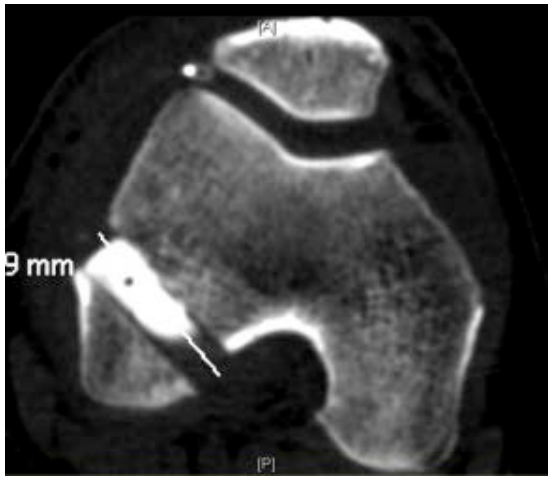
FEMORAL TUNNEL

- OUT-IN technique

Independent drilling of femoral tunnel from antero-lateral portal

Good visibility - knee flexed 90°.

Area of the native ACL insertion easily visible (AM portal)



FEMORAL TUNNEL

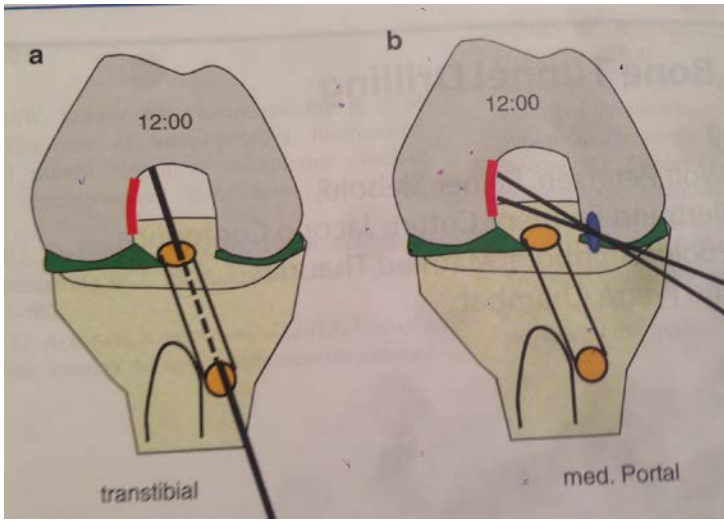
- ACL footprint
- Method reference
- Anatomic
- AM > PL

Araujo PH, van Eck CF, Macalena JA, Fu FH. Advances in the three-portal technique for single- or double-bundle ACL reconstruction. Knee Surg Sports Traumatol Arthrosc 2011; 19:1239-1242.

CLOCK-FACE REFERENCE METHOD

Several issues:

- ignores the depth of the intercondylar notch
- reference position for the 3 and 9 o'clock locations relies on no known anatomic landmarks
- cannot be used when viewing the ACL femoral attachment site through the AM portal



CLOCK-FACE REFERENCE METHOD

« The clock concept is easy to use.

However it is inaccurate in describing the location of femoral tunnel placement and lead to non anatomic position »

Brown C, 2014

FEMORAL TUNNEL

- Which placement ?

Anatomic or « AM »

FEMORAL TUNNEL

- ‘anatomic’ ACL reconstruction is defined as “the functional restoration of the ACL to its native dimensions, collagen orientation and insertion sites.”
- the bone tunnels are placed at the centre of the native ACL attachment sites (at the centre of the AM and PL bundle attachment sites for DB aclR)

van Eck et al, 2014

Anatomic placement/AM placement

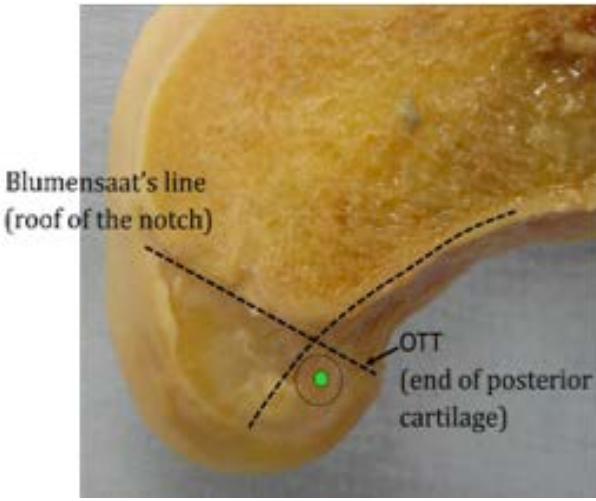
- ACL graft placed at the centre of the native ACL attachment sites:

  - more effective at controlling anterior tibial translation and the pivot-shift

  - more closely reproduces normal knee kinematics

- Based on biomechanical studies

Pictures from Smiglieski



Driscoll MD et al. Comparison of 2 femoral tunnel locations in anatomic single-bundle anterior cruciate ligament reconstruction: a biomechanical study. Arthroscopy 2012

Yamamoto Y et al. Knee stability and graft function after anterior cruciate ligament reconstruction: a comparison of a lateral and an anatomical femoral tunnel placement. Am J Sports Med 2004

Femoral tunnel

Keys for successful femoral tunnel ?

- Avoid a transtibial tunnel
- Check your tunnel position via AM portal
- Anatomic

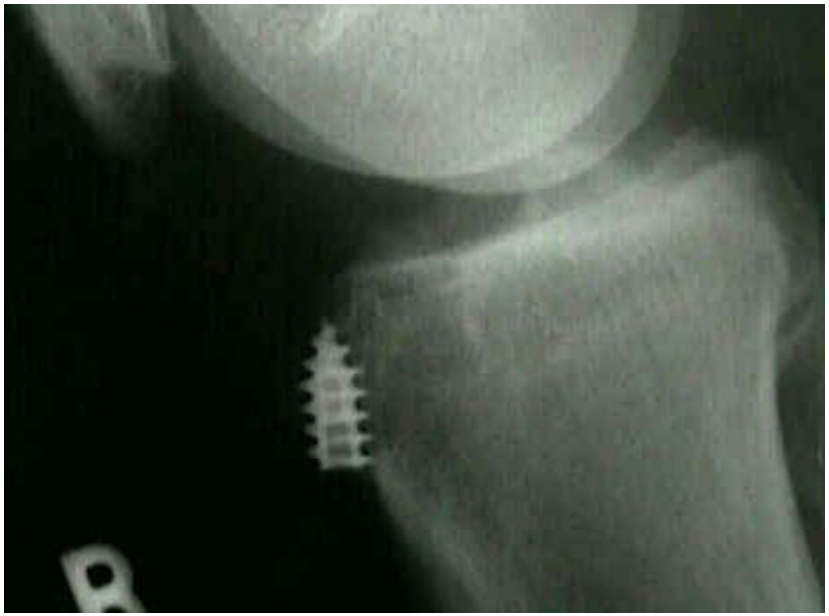
  center of the acl (ribbon/AM-PL bundles)

Osti et al
Am J Sports Med. 2015 Sep;43(9):2250-8
Femoral and tibial graft tunnel parameters after transtibial, anteromedial portal, and outside-in single-bundle anterior cruciate ligament reconstruction.

TIBIAL TUNNEL

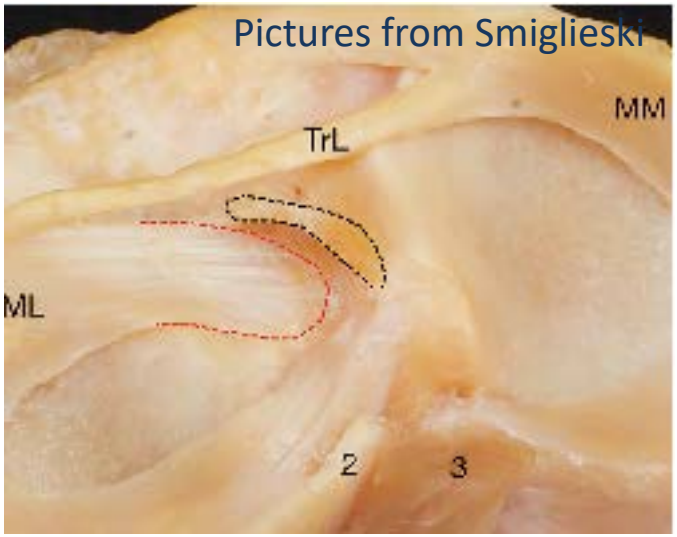
common error

Too Anterior+++



TIBIAL TUNNEL

- Tibial guide fixed at 55° on the stump (debrided) of the acl
- Center of the tunnel is at 7 mm anterior to PCL notch in line with posterior border of the anterior horn of LM
- No!!!



Morgan et al, 1995

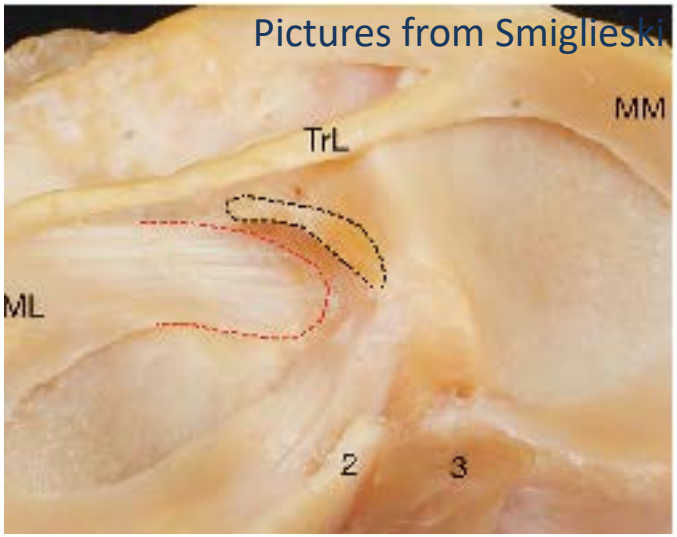
Jackson et al, 1994

TIBIAL TUNNEL

- Too anterior

Notch impingement, lack of extension

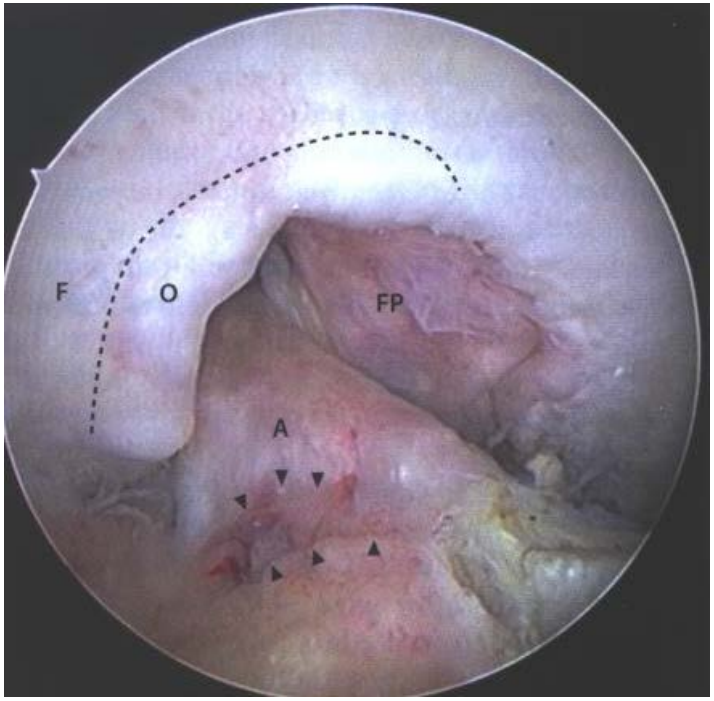
Before drilling, check the pin in extension



- Too posterior (rare)
- Too lateral/to medial

TIBIAL TUNNEL

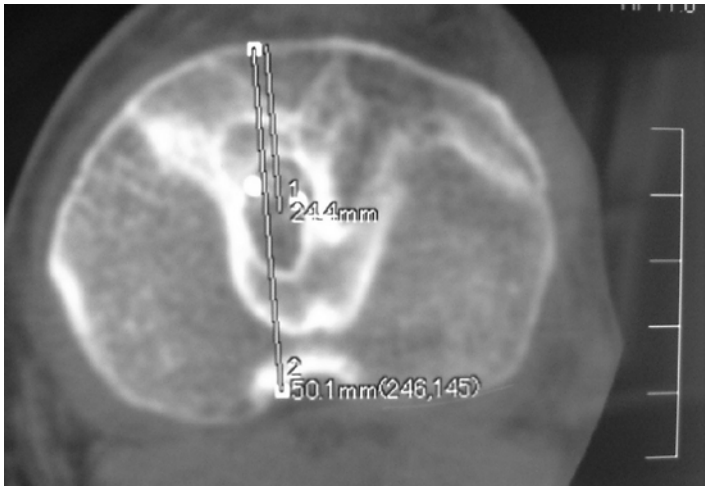
- Role of Notchplasty
should be avoided
(effect on anterior stability)



Keklikci K et al, 2013 KSSTA.The effect of notchplasty in anterior cruciate ligament reconstruction: a biomechanical study in the porcine knee.

TIBIAL TUNNEL

- Restore anatomy
- Preserve the stump
- For the SB aclR : aim the center of acl insertion : « anatomic »
- Stump should be removed if any impingement in extension (avoid cyclops Sd)



Astur DC et al
Arthroscopy. 2013 ;29(5)Characterization of cruciate ligament impingement: the influence of femoral or tibial tunnel positioning at different degrees of knee flexion.

CONCLUSION

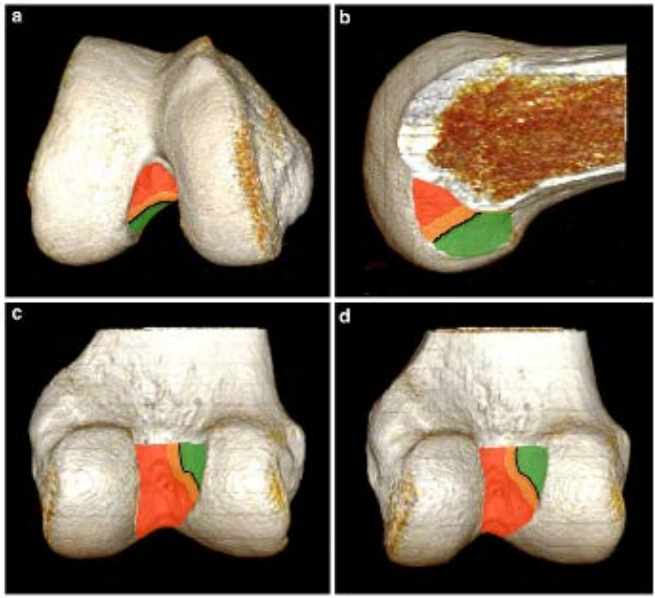
avoid potential mistakes

1/ failure to visualize the femoral insertion completely (use AM portal)

2/ use of wrong reference

(clock face, anterior horn LM)

3/ anatomic tunnel (center of acl)



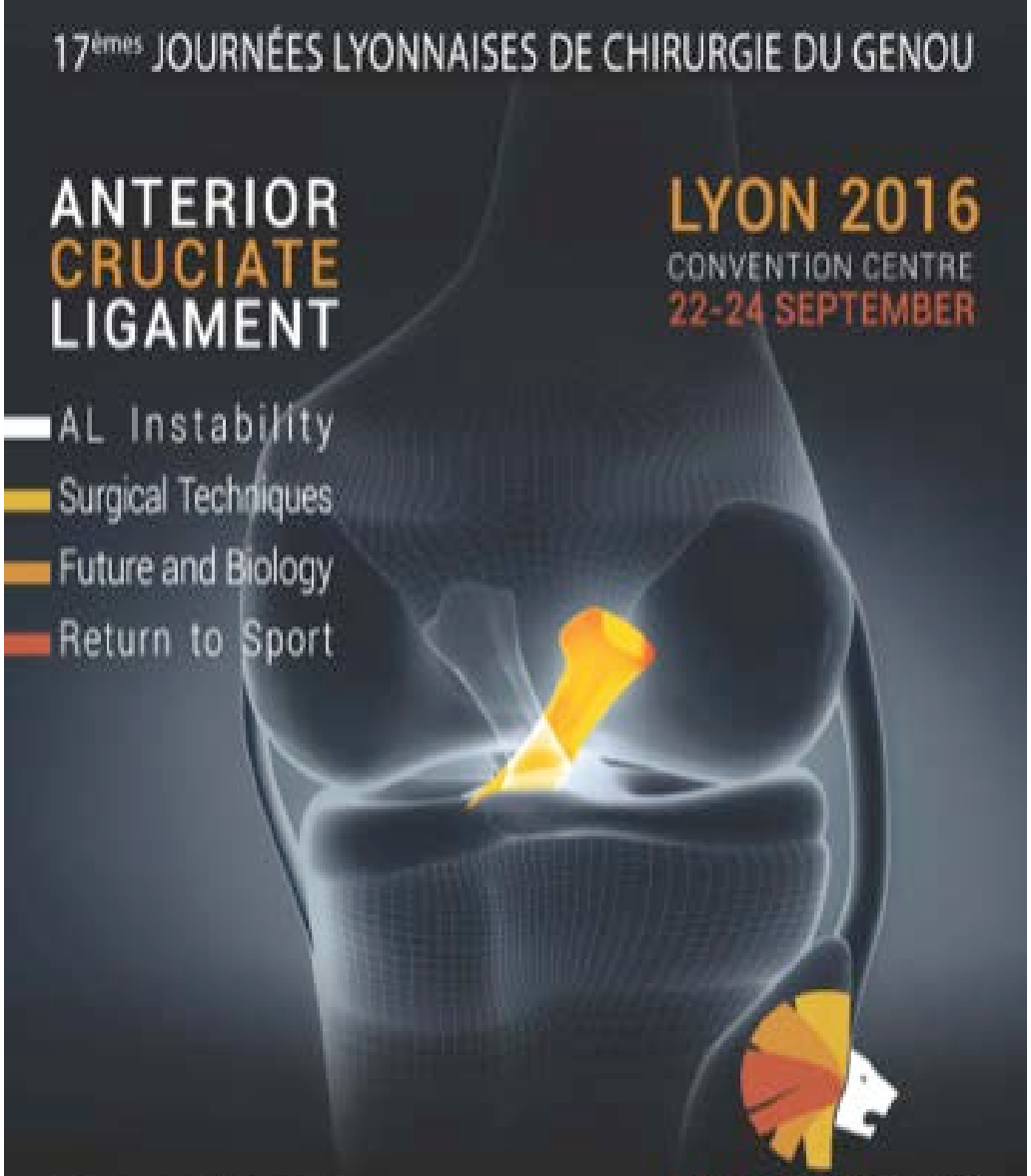
17èmes JOURNÉES LYONNAISES DE CHIRURGIE DU GENOU

ANTERIOR CRUCIATE LIGAMENT

- AL Instability
- Surgical Techniques
- Future and Biology
- Return to Sport

LYON 2016

CONVENTION CENTRE
22-24 SEPTEMBER



LYON SCHOOL of KNEE SURGERY

www.lyon-knee-surgery.com

INTERACTIVE SESSIONS

SIMULTANEOUS TRANSLATION

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