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The Risk of Growth Changes During Transphyseal Drilling in Sheep With Open Physes

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Purpose:

A sheep model was used to evaluate the risk of growth disturbances of transphyseal drillingand anterior cruciate ligament (ACL) reconstruction.

Methods:

In group A, comprised of six4-month-old Merino sheep, the ACL was resected and 5-mm tunnels were drilled and left empty.Unilateral ACL reconstruction using an autologous Achilles tendon graft, extracortical fixation, andtunnel diameters of 5 mm was performed in group B. A single-stranded graft with a diameter of 5mm was used in group B-1 (N 6) and a 3-mm double-stranded graft in group B-2 (N 6). Sixmonths after the procedure, the animals were euthanized. Growth changes were evaluated macro-scopically, by magnetic resonance imaging, and by histology.

Results:

Central growth plate lesionson the tibia did not induce growth abnormalities. On the peripheral femur, posterolateral growth plateinjuries with empty tunnels led to a shortening of the lateral femur of 8 mm (7 to 10 mm), a valgusdeformity of 12.8° (12° to 14°), and a flexion deformity of 8.6° (5° to 15°). Histology revealed astrong bone bridge over the physis and an injury to the perichondral structures. Transphyseal ACLreplacements did not cause growth disturbances on either the tibia or the femur, even if a drillinginjury of the perichondral structures occurred.

Conclusions:

Despite consistent physeal damage,ACL reconstructions did not lead to clinically relevant growth disturbances.

Clinical Relevance:

Theresults suggest that transphyseal ACL reconstruction procedures might yield similar results inchildren with substantial growth remaining.

Key Words:

Anterior cruciate ligament — Growthplate — Knee — Open physes.

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The Reproducibility of Radiographic Measurement of Medial Meniscus HornPosition

Philippe Wilmes, M.D., Konstantinos Anagnostakos, M.D., Christian Weth, Dieter Kohn, M.D., and Romain Seil, M.D.

Purpose:

The objective oft his investigation was to evaluate the possibility of locating and repro-ducing the tibial insertion areas of the anterior and posterior horns of the medial meniscus on preoperative radiographs according to an established method for the lateral meniscus.

Methods:

In 20 tibia heads, we prepare danterior and posterior horn insertions and marked their circumference with radiopaque steel balls of 1.6 mm in diameter. Standardized anteroposterior and lateral radiographs were made. On these radiographs, different landmarks were defined, their distances measured (tibial width and depth, distance from lateral tibia border to meniscus insertion midpoint, distance from anterior tibia border to meniscus insertion midpoint, distance from anterior and lateral tibia border to medial intercondylar spine), and ratios determined.

Results:

The anterior horn midpoint is located at 57.3% ± 2.7% of tibial width and 12.0% ± 1.0% of tibial depth, and the posterior horn midpoint is located at 56.5% ± 1.6% of tibial width and 81.6% ± 3.4% of tibial depth. The statistical analysis of the semeasures showed a precise and constant positioning of the medial meniscus insertions on the tibia plateau. We also found constant topographic relations to the medial intercondylar spine.

Conclusions:

The midpoints of both insertion areas of the medial meniscus have constant positions at 57.3% and 56.5% oft ibial width and at 12.0% and 81.6% of tibial depth for the anterior and posterior horn, respectively. They can precisely and reproducibly be define.iographs.

ClinicalRelevance:

We have developed a technique for precise radiographic tibial horn determination, exact placement of the tibial tunnels, and thus reconstruction of meniscus insertion anatomy in medial meniscus transplantation.

KeyWords:

Medial meniscus — Meniscus transplantation — Meniscus insertion anatomy — Bony landmarks

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