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Rectangular Tunneling for Anatomical Anterior Cruciate Ligament Reconstruction

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There have been many recent improvements in cruciate ligament surgery of the knee. The Anterior Cruciate Ligament (ACL) reconstruction has been changed from isometric placement to anatomical position for restoration of normal kinematics and prevention rotational instability [1,2]. Recent cadaveric study reported that femoral footprint of the ACL was flat, ribbon like appearance [3] and tibial footprint of the ACL also was not round and C-shaped appearance [4]. In addition, recent study reported that ACL graft was located eccentrically in round shape femoral tunnel in anatomical ACL reconstruction [5]. Moreover, recent biomechanical studies showed that ACL fibers located high within the femoral footprint bear more force and were more isometric than low fibers during knee flexion [6]. Another clinical study reported that location of the femoral tunnel near the antero medial bundle and center led to better ACL graft signal intensity on MRI in anatomic single-bundle ACL reconstruction [7]. Therefore, a rectangular tunneling in high portion of ACL femoral footprint using rectangular shape dilator can be a desirable method for anatomical ACL reconstruction (Figures 1-3). A rectangular shape tunnel need to be created with marginal rounded rectangular dilator because a marginal rounded rectangular tunnel is more similar to native footprint shape and can cover more widely of the ACL femoral footprint. Recent biomechanical study reported that rectangular femoral ACL fixation constructs and grafts was more efficacious at restoring ACL kinematics than round femoral tunnels [8]. In addition, recent study showed that

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Figure 1:

Figure 2:

Figure 3:

a rounded rectangular tunnel was reduced tunnel enlargement ratio than round tunnel [9]. Although rectangular ACL reconstruction has several advantages for biomechanics, further studies with high level need for routine clinical application.

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