

# Pearls and Pitfalls of the ToggleLoc With ZipLoop for Anterior Cruciate Ligament Reconstruction



Mitsuaki Kubota, M.D., Ph.D., Ryuichi Ohno, M.D., Ph.D., Taisuke Sato, M.D.,  
Daiju Yamada, M.D., Shin Fukusato, M.D., and Kazuo Kaneko, M.D., Ph.D.

**Abstract:** The ToggleLoc with ZipLoop is an adjustable suspensory device for anterior cruciate ligament reconstruction. However, there is no string to flip the button in the device because it has only one hole and one string. Therefore, the surgeon cannot use the button flip technique. The purpose of this article is to present the pearls and pitfalls of using ToggleLoc with ZipLoop. While preparing the ACL graft, we draw a 15- to 20-mm-width marking in the adjustable loop at the same length as the femoral tunnel depth. While passing of the graft, the tensioning sutures are placed at the anterior side to make sure they pass through the medial portal smoothly. The proximal passing suture and distal adjustable loop is pulled to the opposite direction by one surgeon's hands while passing the button. We stop pulling the sutures just at the marking while feeling the button being passed over the lateral femoral cortex. The distal artificial ligament is held distally with moderate tension while passing the graft. Although there are some pitfalls and knacks, the present technique is easy and certainly helps surgeons achieve appropriate positioning of the button.

The ToggleLoc with ZipLoop (Zimmer Biomet, Warsaw, IN) is a fixation device for anterior cruciate ligament (ACL) reconstruction. It has an adjustable loop that fits all sizes of bone tunnels, and it is not necessary to create an extra socket to flip the button. The adjustable loop device allows to draw the graft to the depth of the bone tunnel to achieve adequate graft tension while minimizing the empty space in the tunnel. The ToggleLoc with ZipLoop has a characteristic different from that of comparable adjustable loop devices. While the tensioning sutures of the similar adjustable loop devices are passed to the proximal side, that of the ToggleLoc with ZipLoop was passed to the distal side (Fig 1). Therefore, there is

lower risk that the button will be pulled too far off the lateral femoral cortex. Another different characteristic is the aspect of the button. The button of ToggleLoc with ZipLoop has no string to flip the button because it has only one hole for the passing suture (Fig 2). Therefore, there are a few pitfalls for passing the button over the femoral tunnel and flipping the button. For example, when the button was not passed over the femoral tunnel, it was buried in the femur. In addition, it is difficult to distinguish the tensioning suture from the adjustable loop in the arthroscopic view because they are passed together in the bone tunnel. The literature of a flip technique of the similar device was reported as self-flip technique.<sup>1</sup> However, there is no report about the technique of the ToggleLoc with ZipLoop. We describe the pearls and pitfalls of the ToggleLoc with ZipLoop for ACL reconstruction.

## Technique

After arthroscopic examination, ACL remnant and excessive synovial membrane were removed with minimum necessary at the position of the affected leg hanged. When the hamstring graft was harvested, the leg was held on the table by leg holder. The semitendinosus tendon (ST) graft was harvested and looped with the ToggleLoc Long with ZipLoop, and 2.5 mm of the artificial ligament (AI medic, Tokyo) is used for the hybrid technique (Fig 1). A 4-strand ST graft was used for the single-bundle reconstruction, and double

*From the Department of Orthopaedic Surgery, Koshigaya Municipal Hospital, Higashi-Koshigaya, Saitama (M.K., R.O., T.S., D.Y., S.F.); and Department of Orthopaedic Surgery and Sports Medicine, Juntendo University, School of Medicine, Bunkyo-ku, Tokyo (K.K.), Japan.*

*The authors report that they have no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).*

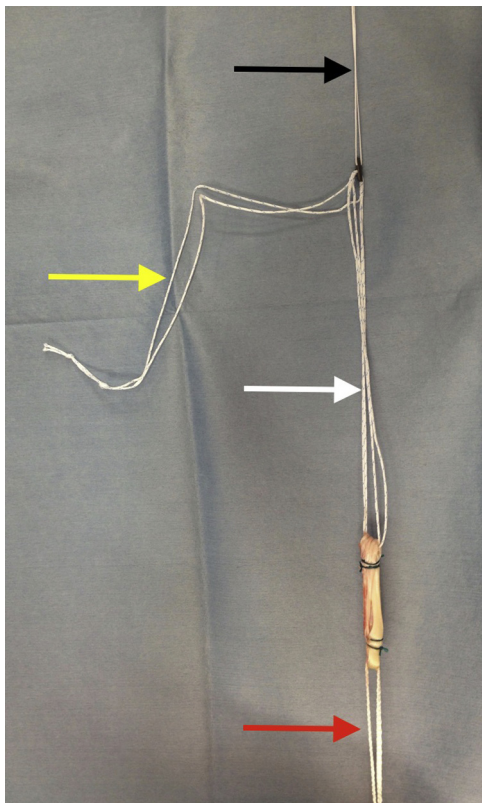
*Received February 12, 2018; accepted April 13, 2018.*

*Address correspondence to Mitsuaki Kubota, M.D., Ph.D., 10-47-1, Higashi-Koshigaya, Saitama, 3430023, Japan. E-mail: [mkubota@juntendo.ac.jp](mailto:mkubota@juntendo.ac.jp)*

*© 2018 Published by Elsevier on behalf of the Arthroscopy Association of North America. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).*

*2212-6287/18207*

*<https://doi.org/10.1016/j.eats.2018.04.007>*



**Fig 1.** The ToggleLoc with ZipLoop. Upper string is a proximal passing suture (black arrow), the string between the button and the graft is an adjustable loop (white arrow), and the left-side string is a tensioning suture (yellow arrow). An artificial ligament (red arrow) is used distally for the hybrid technique.

2-strand ST grafts are used for the double-bundle reconstruction.

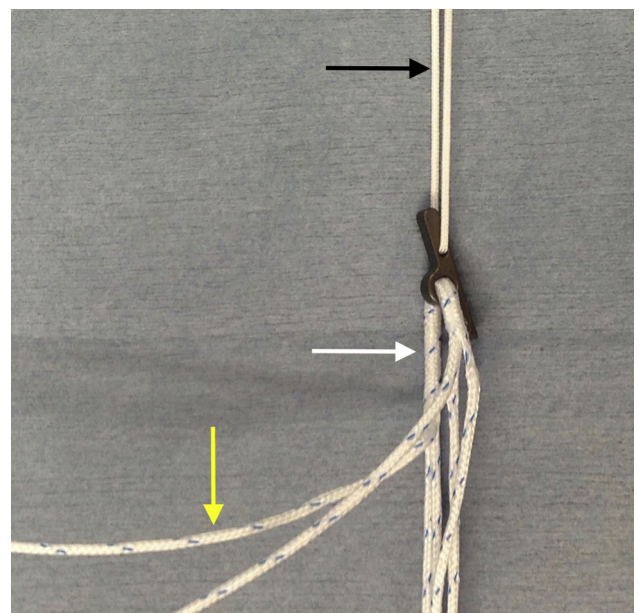
The appropriate diameter of the femoral tunnel is created using the inside-out technique from the far medial portal at deep flexion positioning. A 15-mm femoral socket is created with a drill adjusted to the diameter of the graft under the arthroscope (Fig 3A). The length of the femoral tunnel was measured by depth gauge at positioning deep flexion (Fig 3B). The appropriate diameter of the tibial tunnel is also created using the ACL tibial guide (Zimmer-Biomet). After sizing the femoral tunnel, we are marking 15-20mm width in the loop of the ToggleLoc with ZipLoop at the same length as the femoral tunnel from the end of the button (Fig 4). While passing the graft, the tensioning sutures are placed in front of the loop to make them pass through the medial portal smoothly (Fig 5). Furthermore, the lateral side of the button faces the lateral side in the arthroscopic view because it makes it easier to flip the button (Fig 6).

The proximal femoral passing suture and distal artificial ligament is pulled to the opposite direction with the hands of the surgeon while passing the button (Fig 7). We stop pulling the sutures just at the proximal

marking area while feeling the button being passed over the lateral femoral cortex (Video 1). The distal artificial ligament is held distally with moderate tension when passing the button. After the tensioning suture is pulled out to the medial portal, it is pulled to draw the ACL graft into the femoral tunnel. If the graft fits the femoral tunnel, it is confirmed that the graft cannot be displaced distally. Finally, the distal artificial ligament is fixed by double staple while tensioning for 50 N distally at 20° knee flexion.

## Discussion

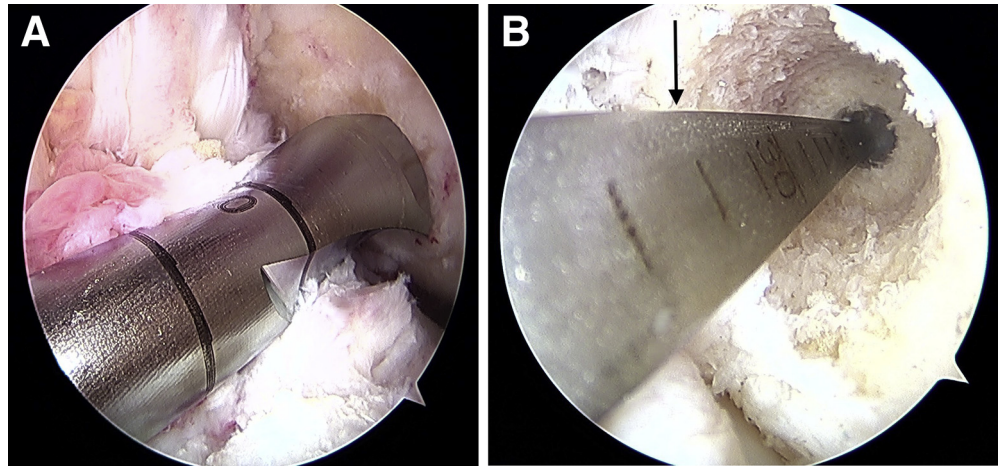
Selection of a graft fixation device is an important factor that determines the outcome of ACL reconstruction. Among various devices, use of an adjustable loop suspensory fixation device in ACL reconstruction attracts current interest.<sup>2</sup> The ToggleLoc with ZipLoop has some advantages and disadvantages (Table 1). The advantage is its ability to draw the ACL graft to the depth of the bone tunnel to achieve adequate graft tension while minimizing the empty space in the tunnel. Therefore, the shortened empty space in the tunnel may potentially decrease the “bungee cord effect,” resulting in less postoperative tunnel widening. Another advantage is to avoid the button floating because the tensioning sutures are passed to the distal side while drawing the ACL graft to the femoral tunnel. On the other hand, its disadvantage is the loosening of the adjustable loop compared to the fixed loop after cyclic loading in biomechanical comparison.<sup>3</sup> Another disadvantage is a difficulty to flip the button because the



**Fig 2.** The button of the ToggleLoc with ZipLoop. There is no string to flip the button because it has only one hole for the passing suture. (Black arrow: passing suture; white arrow: adjustable loop; yellow arrow: tensioning suture.)



**Fig 3.** Drilling of femoral bone tunnel at deep flexion positioning. (A) Arthroscopic view of the left knee from the central portal. (B) Lateral femoral condyle is seen at the right edge (black arrow). A 15-mm femoral socket is created with a drill adjusted to the diameter of the graft under the arthroscopy. The length of the femoral bone tunnel was measured by depth gauge at deep flexion positioning. The length is 34 mm (black arrow).

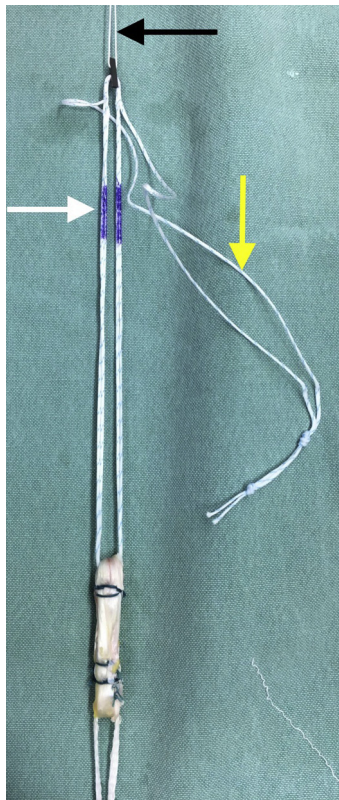


ToggleLoc with ZipLoop has no string to flip the button. However, there is no significant difference in postoperative knee stability or graft failure rates between adjustable-loop and fixed-loop femoral cortical suspension in patients undergoing primary ACL reconstruction.<sup>4</sup> In addition, femoral fixation by use of adjustable-loop devices showed similar clinical

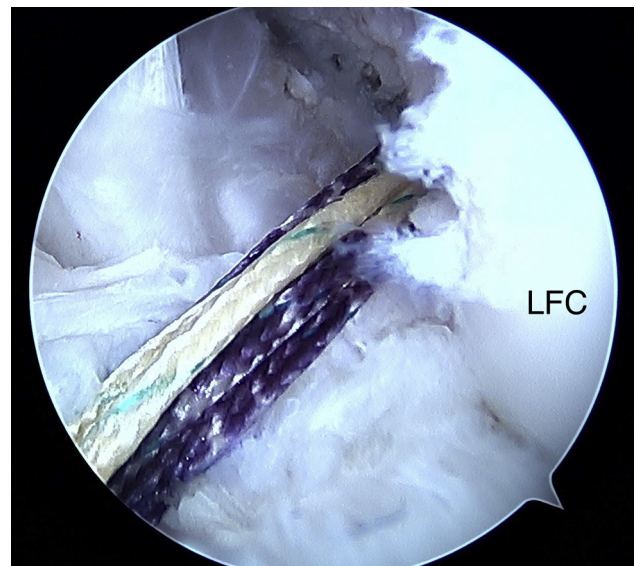
outcomes with femoral fixation by use of fixed loop devices.<sup>5</sup> Therefore, use of adjustable-loop devices has recently expanded, unlike fixed-loop devices.

Most surgeons prefer to substitute various adjustable-loop devices with 2-hole buttons because the latter have a button flip technique. However, the surgeon cannot use the button flip technique with the ToggleLoc with ZipLoop because the ToggleLoc with ZipLoop has only one hole and one string.

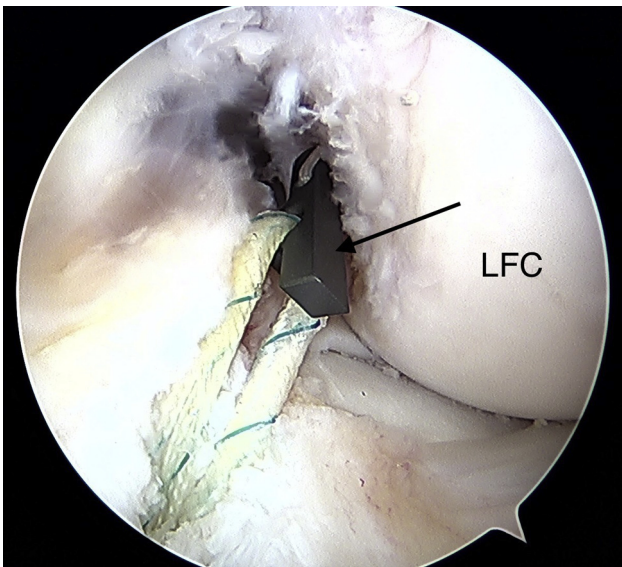
There are a few pearls and pitfalls in this technique (Table 2). First, when the button was not passed over the femoral tunnel, it was buried in the lateral femoral condyle. When we started an ACL reconstruction with the ToggleLoc, we always had the operated knee



**Fig 4.** Marking to the loop. After sizing the femoral tunnel, we are marking a 15-20-mm width (white arrow) in the adjustable loop at the same length as the femoral tunnel from the end of the button. (Black arrow: passing suture, yellow arrow: tensioning suture.)



**Fig 5.** Position of the tensioning sutures. Arthroscopic view of the left knee from the central portal. While passing the graft, the tensioning sutures (not colored) are placed in front of the loop (colored) to enable them to smoothly pass through to the medial portal. (LFC, lateral femoral condyle.)



**Fig 6.** Position of the button. Arthroscopic view of left knee from the central portal. The lateral side of the button faces the lateral side in the arthroscopic view (black arrow), because it makes the button to flip easier. (LFC, lateral femoral condyle.)

extended and confirmed with fluoroscopy that the button passed over the femoral tunnel. Nevertheless, it is difficult to pass the button over the femoral tunnel,



**Fig 7.** Passing the button (left knee). The proximal femoral passing suture (black arrow) and distal tibial artificial ligament (red arrow) are pulled to the opposite direction with the hands of the surgeon when passing the button. The tensioning suture (yellow arrow) was held in front of the adjustable loop.

**Table 1.** Advantages and Disadvantages of ToggleLoc With ZipLoop

Advantages

1. Ability to draw the ACL graft to the depth of the femoral bone tunnel to achieve adequate graft tension while minimizing the empty space in the femoral bone tunnel
2. Avoid the button floating because the tensioning sutures are passed to the distal side while drawing the ACL graft to the femoral bone tunnel

Disadvantages

1. Loosening of the adjustable loop compared to the fixed loop after cyclic loading In biomechanical comparison
2. Difficult to flip the button because the ToggleLoc with ZipLoop has no string for it

because the ACL graft is bent when the knee was extended. In addition, it is expected that the infection rate increases by using fluoroscopy. Therefore, we changed the knee flexion angle from 0° to 90° when pulling the passing suture proximally. This method allows to smoothly pass the button over the femoral tunnel, and it is easier to feel the button passing over the femoral tunnel. Moreover, ToggleLoc long type makes it easier to pass the button over the femoral tunnel because the ACL graft does not get stuck in the tibial tunnel.

Second, it is difficult to distinguish the tensioning suture from the adjustable loop in the arthroscopic view because they are passed together in the bone tunnel. Marking in the adjustable loop of the ToggleLoc with

**Table 2.** Pearls and Pitfalls of ToggleLoc With ZipLoop

Pearls

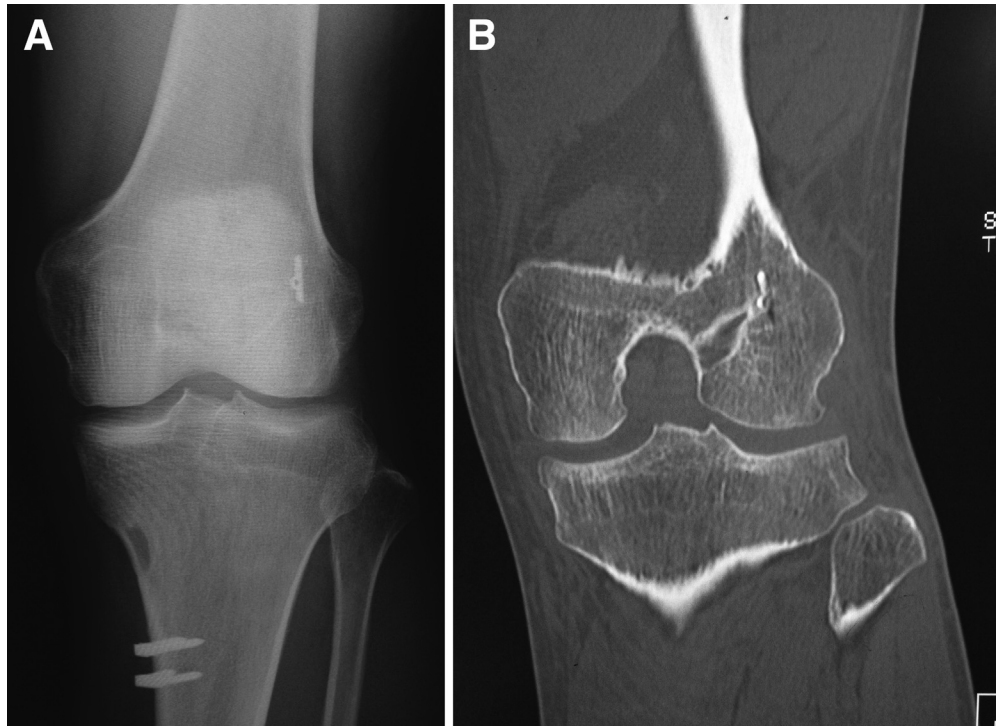
- 1 Pull the passing suture proximally at the knee 90° flexion to pass the button over the femoral tunnel smoothly
- 2 Use the ToggleLoc long type to avoid the ACL graft getting stuck in the tibial bone tunnel
- 3 Marking a 15-20 mm width in the loop of the ToggleLoc with ZipLoop at the same length as the femoral tunnel from the end of the button
- 4 Place the tensioning sutures in front of the adjustable loop to enable them to smoothly pass to the medial portal
- 5 Face the lateral side of the button to the lateral side in the arthroscopic view because it makes the button easier to flip.
- 6 Pull the proximal femoral passing suture and distal tibial adjustable loop to the opposite direction with the hands of the surgeon when passing the button. Stop pulling the sutures just at the proximal marking area while feeling the button being passed over the lateral femoral cortex.
- 7 Place the femoral aperture more proximally to avoid the blowout of the femoral bone tunnel by the button.

Pitfalls

1. Do not use the button flip technique because the ToggleLoc with ZipLoop has no string to flip the button because it has only one hole for the passing suture (Fig 2)
2. It is difficult to distinguish the tensioning suture from the adjustable loop in the arthroscopic view because they are passed together in the bone tunnel.
3. The button breaks through the femoral tunnel while passing the ACL graft because the tensioning suture is pulled to the distal side to draw the ACL graft.



**Fig 8.** The button breaks through the femoral bone tunnel. Anteroposterior radiograph (A) and CT (B) of the left knee, respectively. If the femoral bone tunnel aperture is distally, the risk of femoral bone tunnel breakage increases because the distal femoral condyle cortex is thin and weak. The button is forced distally at the lateral femoral cortex because the tensioning suture was pulled to the distal side when drawing the anterior cruciate ligament graft.



ZipLoop makes it easier to distinguish the tensioning sutures from the adjustable loop. In addition, while passing of the graft, the tensioning sutures are placed on the anterior side to make them smoothly pass toward the medial portal. When the passing sutures are pulled out to the medial portal, the distal artificial ligament is pulled distally to avoid the adjustable loop getting entangled with the tensioning sutures.

Third, a position of the tunnel in the lateral femoral cortex should be placed proximally. If the position is drilled distally, the button breaks through the femoral tunnel while passing the ACL graft because the distal femoral condyle cortex is thin and weak (Fig 8 A and B). The button is forced distally at the lateral femoral cortex because the ToggleLoc with ZipLoop was passed toward the distal side. Unfortunately, we experienced one case of a broken tunnel in a 45-year-old woman. We produced a new femoral tunnel proximally. Especially, we should exercise caution in older patients to avoid broken tunnels.

However, the technique of using the ToggleLoc with ZipLoop is easy, and surgeons do not need to spend much time to master the technique. We hope our

technical report can facilitate and encourage the use of ToggleLoc with ZipLoop.

## References

1. Harato K, Niki Y, Toyoda T, et al. Self-flip technique of the TightRope RT button for soft-tissue anterior cruciate ligament reconstruction. *Arthrosc Tech* 2016;5:e391-e395.
2. Yoshiya S. Editorial Commentary: Controversy on fixation properties of the adjustable-loop cortical suspension fixation device used for anterior cruciate ligament reconstruction. *Arthroscopy* 2016;32:262.
3. Johnson JS, Smith SD, LaPrade CM, Turnbull TL, LaPrade RF, Wijdicks CA. A biomechanical comparison of femoral cortical suspension devices for soft tissue anterior cruciate ligament reconstruction under high loads. *Am J Sports Med* 2015;43:154-160.
4. Boyle MJ, Vovos TJ, Walker CG, Stabile KJ, Roth JM, Garrett WE Jr. Does adjustable-loop femoral cortical suspension loosen after anterior cruciate ligament reconstruction? A retrospective comparative study. *Knee* 2015;22:304-308.
5. Choi NH, Yang BS, Victoroff BN. Comparison between fixed-loop and adjustable-loop cortical suspension devices. *Am J Sports Med* 2017;45:826-831.