

ORIGINAL RESEARCH ARTICLE

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION WITH HAMSTRING AUTOGRAFT USING BIOABSORBABLE VERSUS TITANIUM INTERFERENCE SCREW IN TIBIAL TUNNEL IN GOVERNMENT HOSPITAL OF WEST NEPAL

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ABSTRACT

**Background:** Arthroscopic anterior cruciate ligament reconstruction can be performed both with titanium and bioabsorbable interference screws. The purpose of this study was to compare functional outcomes after reconstruction using these different implants.

**Methods:** This was a retrospective study. Patients who underwent ACL reconstruction with hamstring autograft at Bheri hospital over the designed period were observed. Each group (titanium and bioabsorbable screws) consisting of 20 patients were compared using Lysholm knee scores at 3, 6 and 12 months postoperatively. Statistical analysis was done using SPSS version 24. Chi square test was applied for comparing functional outcomes. Confidence interval of 95%, p value less than 0.05 was taken as significant.

**Results:** Mean Lysholm scores at 3, 6 and 12 months were 61.70, 69.60 & 85.90 for titanium group and 62.65, 70.95 & 84.65 for bioabsorbable screw group. The differences were not statistically significant.

**Conclusions:** Functional outcomes at each follow up was equivalent among patients using either titanium or bioabsorbable screws.



INTRODUCTION

Anterior cruciate ligament is crucial structure for knee stability. ACL deficient knee require ligament reconstruction to avoid instability and future degenerative changes.<sup>1-3</sup>

Suspensory fixation at femoral tunnel and titanium or bioabsorbable (poly-L-lactic acid with hydroxyapatite (PLLA-HA) interference screws at tibial tunnel is commonly used for securing graft<sup>4 5</sup>. After ACL reconstruction, the weakest part of the ACL graft is at the fixation site.<sup>5, 6</sup> Bio-absorbable screws offer theoretical advantages in imaging and surgery, however they are costly compared to titanium interference screws. There are few reported complications of bio-absorbable screws like implant breakage, decreased pull out strength and higher rates of knee effusion.<sup>7- 10</sup> Aperture fixation with titanium interference screws in tibial tunnel have been widely used all over the world. They are cheaper than bioabsorbable screws. Good clinical outcome has been reported along with fewer complications. Graft damage during insertion, metallic artifact in radiological imaging and difficulty with revision surgery are known disadvantages.<sup>11-14</sup>

There is scarce of literature from government-based hospitals outside Kathmandu and from non-medical college set up. The aim of the study was to compare functional outcomes of ACL reconstruction with hamstring autograft using bioabsorbable versus titanium interference screw in tibial tunnel.

METHODS

This was a retrospective study conducted at Bheri Hospital, Nepalgunj. Cases of ACL injuries getting operated at Bheri Hospital between November 2017 to October 2020 and fulfilling criteria were included in the study. Permission for study was obtained from hospital administration and subsequent Ethical clearance was obtained from Nepal health research council (NHRC, Reference No 1129 /22-11-2021) for conducting this study.

Patients attending OPD and emergency of Bheri hospital with suspected anterior cruciate ligament tears were evaluated clinically and radiologically (MRI). Patients choosing operative reconstruction were given options for bioabsorbable and titanium interference screws and consent was received

accordingly.

Arthroscopic anatomical anterior cruciate ligament reconstructions with use of hamstring grafts were performed. Graft was fixed with endobuttons at femoral tunnel and with bioabsorbable or metallic interference screws at tibial tunnel. They followed standardized rehabilitation protocols and functional outcomes were assessed by using Lysholm score at 3 months, 6 months and 1 year of follow-up.

Patient aged 18 years and older who underwent primary ACL reconstruction with Hamstring graft were enrolled. Patients with History of ACL reconstruction in either knee, Contralateral ACL injury, chondral injury or concurrent significant other ligament injury were excluded.

Statistical analysis was done using SPSS version 24. Chi square test was applied for comparing functional outcomes. Confidence interval of 95%, p value less than 0.05 was taken as significant.

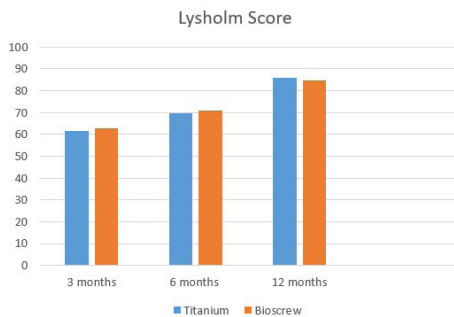
**RESULTS**

There were 20 patients each in titanium and bioabsorbable screw groups. Mean age was 29.15 years for titanium and 28.90 years for bioabsorbable group. Right limb was involved in 60% of cases in titanium and 55% of cases in bioabsorbable group.

There was no statistical difference between titanium and bioabsorbable in terms of functional outcomes as per Lysholm scores evaluated at 3, 6 and 12 months. There were improvements in functional outcomes in successive follow ups. The mean Lysholm score was 85.90 at 12 months for titanium group and 84.65 for bioabsorbable group.

**Table 1: Study variables for titanium and bioabsorbable screws group**

	Titanium interference Screws	Bioabsorbable screws
Number of patients	20	20
Age	29.15 (+/- 11.6) years	28.90 (+/- 9.03) years
Side ( Right / Left )	60% / 40 %	55% / 45 %
Tourniquet time	66.55 ( +/- 17.78 ) min	68.05 ( +/- 19.41 )
Meniscus lesion	5	6



**Figure 1: Lysholm score observed in 3, 6 and 12 months**

We noticed knee effusions in 3 cases of bioabsorbable screw group and 2 cases of titanium screw group. All cases of effusion subsided in subsequent follow ups. 1 patient in each group developed sensory loss in area supplied by infrapatellar branch of saphenous nerve. Both of them eventually recovered. None of the patients developed signs of infection and no case of screw breakage noted.

**Table 2: Complications**

	Bioabsorbable screws	Titanium screws
Infections	none	none
Screw breakage	none	none
Knee effusions	3	2
Sensory loss in area supplied by infrapatellar branch of saphenous nerve	1	1

**DISCUSSION**

Following ACL reconstruction, weakest point of ACL graft is the tibial fixation site.<sup>5,6</sup> Interference screws provide a stable construct to allow graft to bone healing.

The advantages of titanium interference screws are that they provide solid fixation and well tolerated by body.<sup>11</sup> They are MRI compatible and cheaper in price compared to bioabsorbable screws. Possible disadvantages are potential lacerations of grafts during insertion and interferences with future surgeries.<sup>11-14</sup>

Poly-L- lactic acid has a reasonable half-life of approximately 6 months. Complete reabsorption should take place in approximately 3 to 5 years.<sup>11</sup> Clinical advantages of PLLA screws are that they are bioabsorbable and are degraded to non-toxic products. A local sterile inflammatory reaction is not associated with PLLA.<sup>11</sup> They do not interfere with MRI.<sup>13,14</sup>

The possible advantages of bioabsorbable screws include potentially easier revision surgery and their disappearance after biological healing is completed.<sup>13,14</sup> Intraoperative screw breakage, inflammatory reactions, effusions and possible tunnel widening are possible disadvantages.<sup>11-14</sup>

We did retrospective comparative study of 40 cases. Although intervention and documentation were done previously, patients were available for follow up visits. Our study revealed no statistical difference in functional outcomes between titanium interference screws and bioabsorbable screws. Preoperative variables like age, side of limb were similar whereas intraoperative variables like tourniquet time and meniscus procedures were not statistically significant. Final Lysholm score at the end of 12 months were 85.90 and 84.65 respectively for titanium and bioabsorbable screw group.

Infection, synovitis and screw breakage has been reported. We didn't encounter any cases in both groups.

Peter Myers et al<sup>12</sup> prospectively conducted study on 100 patients and follow up for 2 years. Hamstring autograft was used for all patients. No differences in clinical outcomes were seen by use of Lyshlom and international knee documentation committee scores between the 2 groups at any stage of follow up to 2 years. There were no significant complications in any groups.

Yuval Arama et al<sup>15</sup> performed a prospective, blinded, randomized controlled trial with 5 years follow up with a total of 40 patients. Hamstring autograft was used. International knee documentation committee and Lyshlom scores were used. KT 1000 arthrometer, single legged hop test and MRI were used to evaluate tunnel and screw volume, periscrew ossification, graft integration and cyst formation. There were equivalent clinical results between the titanium and bioabsorbable screws at 2 and 5 years follow ups.

Keran Sundaraj et al<sup>4</sup> extended the study for 13 years and concluded that there were no differences in clinical outcomes at 2, 5 and 13 years between 2 groups. Christopher Kaeding et al<sup>11</sup> performed prospective randomized comparison of bioabsorbable and titanium interference screws for ACL reconstruction. It was multicenter study with bone patella tendon bone graft. Total of 97 patients (48 bioabsorbable screws and 49 titanium group) were available for follow up at 1 year and 65 patients (32 bioabsorbable screws and 33 titanium groups) at 2 years. Both groups had equivalent results at 1 and 2 years follow ups. The results of our study are quite similar with above mentioned studies.

## CONCLUSION

The functional outcomes are good with no major differences between titanium and bioabsorbable screws.

**CONFLICT OF INTEREST:** None

**FINANCIAL DISCLOSURE:** None

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