

Accurate Placement of the Coracoid Graft in Latarjet Procedure: Use of Drill Guide Vs Conventional Free Hand Technique: Comparative Cross-Sectional Study.

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Abstract

Background: The Latarjet procedure is a widely known surgical procedure that is utilized in management of recurrent shoulder instability especially where there is significant glenoid bone deficiency of more than 25 %. Location of the coracoid graft is one of the most significant factors for patients' overall results. This work aims at determining accuracy of placing coracoid grafts in patients using a drill guide and the free-hand methods.

Objectives: the present work aims at comparing the effectiveness of drill guide in coracoid graft positioning in the Technique of Latarjet procedure with the traditional free-hand technique.

Study design: Analytical cross section design

Place and duration of study. From Jan 2019 to June 2021 MTI, LRH Peshawar

Methods: 50 patients who had recurrent shoulder instability were retrieved from hospital computer record. All the preoperative details and post operative details were recorded. All those patients who had been operated since January 2019 till august 2021 were included and we got a total of 50 patients. Patients were then divided into two groups. Group A had all those patients

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who had been operated for recurrent dislocation shoulder and stabilized by Latarjet procedure in which coracoid graft had been fixed by conventional free hand technique , and we got a total number of 30 patients. Group B had all patients in whom graft fixation had been done using Drill guide and we had 20 patients. From the record, the time of surgery retrieved and recorded. Graft positioning was used as the criteria to evaluate the accuracy using postoperative x-ray and CT scans. Post-surgery complications and the clinical and functional outcome of patient at 3months after surgery were noted and recorded.

Results: We had a total of 50 patients. Mean age was 29.7 years (standard deviation was 4.1). In the same study, it was clearly determined that, in the drill guide group B, grafts placed were 93% optimally placed within 2mm to the ideal location, as compared to the free-hand group where only 75% of the grafts were optimally placed ($p < 0.01$). The free hand group A had 0.82% of added complications while the drill guide group recorded only 0.46% ($P < 0.05$), Mean operating time of the drill guide group B was 50 (SD = 10) while the free hand group A mean operating time was 65mins (SD = 10). Complications were 5% for group B and were 15% for free hand group B. Functional outcome and stability scores were comparable in both and shoulder were stable in both groups

Conclusion: This recent study of comparing the use of the drill as a reference point in positioning the coracoid graft in Latarjet procedure with the free-hand method showed that the present technique was accurate, reproducible ,less likely to cause complications and required shorter time to perform the operation. These results imply that, in some way, the utilization of the drill guide may enhance the results of surgeries that are carried out for shoulder instability.

Keywords: Latarjet, drill guide used, coracoid graft, anterosuperior stability, critical bone loss, free hand technique

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Introduction

Traumatic or atraumatic, recurrent shoulder instability with glenoid bone loss is a puzzle in the field of orthopedics. The Latarjet procedure is one of the commonly used surgical methods in the management of recurrent shoulder instability especially in cases of significant anterior glenoid bone deficiency of more than 25 % , or failure of prior surgeries. The surgery entails shift of the coracoid process to the front part of the glenoid thus creating a bone block that does not allow further dislocation by increasing glenoid anterior rim surface, dynamic compression effect of the conjoint tendon, and suturing coracoacromial ligament to the capsule, thus this procedure provides triple effect to prevent dislocation [1, 2]. So, the Latarjet procedure has been proved to be successful. However, the position of the coracoid graft is important and has bearing in this technique of stabilization. Correct positioning of the coracoid graft is critical in an effort to reduce possibilities of graft impingement on humeral head, graft fracture, insecure fixation resulting in non-union, hardware failure and recurrent instability [3]. literature review reveals that failure to position the coracoid graft results to grievous morbidity such as glenohumeral arthritis and loss of motion, which can affect the success of the surgery in the long run [4]. In the

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past, surgeons have used their knowledge and feeling or touch to place the coracoid graft which is referred to as the free-hand technique. Although, followings above protocols of free hand technique are successful particularly for more experienced surgeons; However, this technique is surgeon dependent and so may not be reproducible for the young inexperienced surgeons in term of graft position and so tends to contain certain mistakes, that is the graft malposition rate reaches to 50% at most [5, 6]. To overcome the limitations of free-hand technique, an innovative concept called drill guides has emerged. Drill guides are devices that are meant to increase the accuracy of placing coracoid graft because the guide is fixed in position for screw placement and orientation of the grafts. This may lower the risk of the complications caused by malposition and may help augment the biomechanical results of the Latarjet procedure [7]. The biomechanical analyses of free hand approach have pointed to the effect of the use of a drill guide in minimizing the variability in the graft placement and increasing the dimensional reproducibility among surgeons with different levels of experience [8]. Previous studies has largely targeted biomechanical findings with only a few comparative- controlled large scale trials evaluating clinical efficacy and incidences of complications in actual practice [9]. In our part of the globe , there is no such study to evaluate and compare these two approaches for coracoid graft placement. This absence of evidence has contributed to proving controversy as to the need, and value of drill guides in everyday practice. The objective of this study was to Compare the precision of the coracoid graft placement in the Latarjet procedure with and without a drill guide. The first and more direct measure was the objective of placing the graft in the right position with the help of post-operative x-ray and CT scans. Secondary ones were the complication rates, the time of surgery, and clinical outcome of the shoulders, including stability, movements, and patients' satisfaction. Consequently, this design sought to contribute to scientific literature by presenting the evidences that would help the surgeons to choose the appropriate approaches in order to execute the Latarjet procedure in the most efficient manner.

Methods

50 patients with recurrent shoulder instability with critical glenoid bone deficiency were retrieved from hospital record and enrolled in this study. Patients with age 18-50 years of anterior shoulder instability and confirmed glenoid bone loss more than 25% of the globoid's surface area were in this study. Patients who previously underwent Latarjet surgery, had rotator cuff tear or arthritis to a significant extent were excluded from the study. Patients were distributed among two groups: Group B the drill guide group and Group A the free-hand technique group. All operations had been carried by shoulder surgeons with minimum of half a decade of experience. All record retrieved including demographics, time taken for surgery , immediate post operative x-ray and CT Scan and then post op outcome.; **Figures,1,2,3,4**

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Figure 1; GUIDE OVER CORCOID



Figure 2; DRILLGUIDE

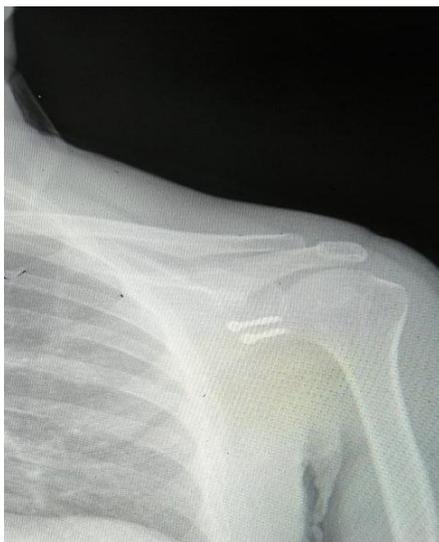


Figure 3; Post -op XRAY

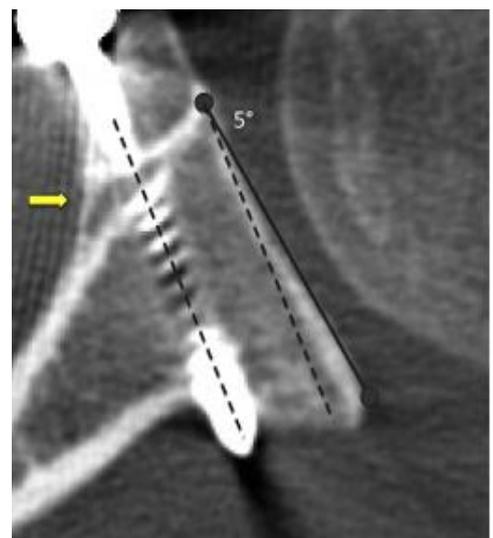


Figure 4; AXIAL CUT CT

Data Collection

Whole record had been retrieved from hospital record. Data were collected before operation including demographics, during the operation and after the operation. Preoperative information consisted of patient's demographic information, radiographic findings, time taken in the operation theater, and post operative CT scan of the operative shoulder. Post operative complications, stability and function of shoulder were assessed clinically after surgery till 3 months.

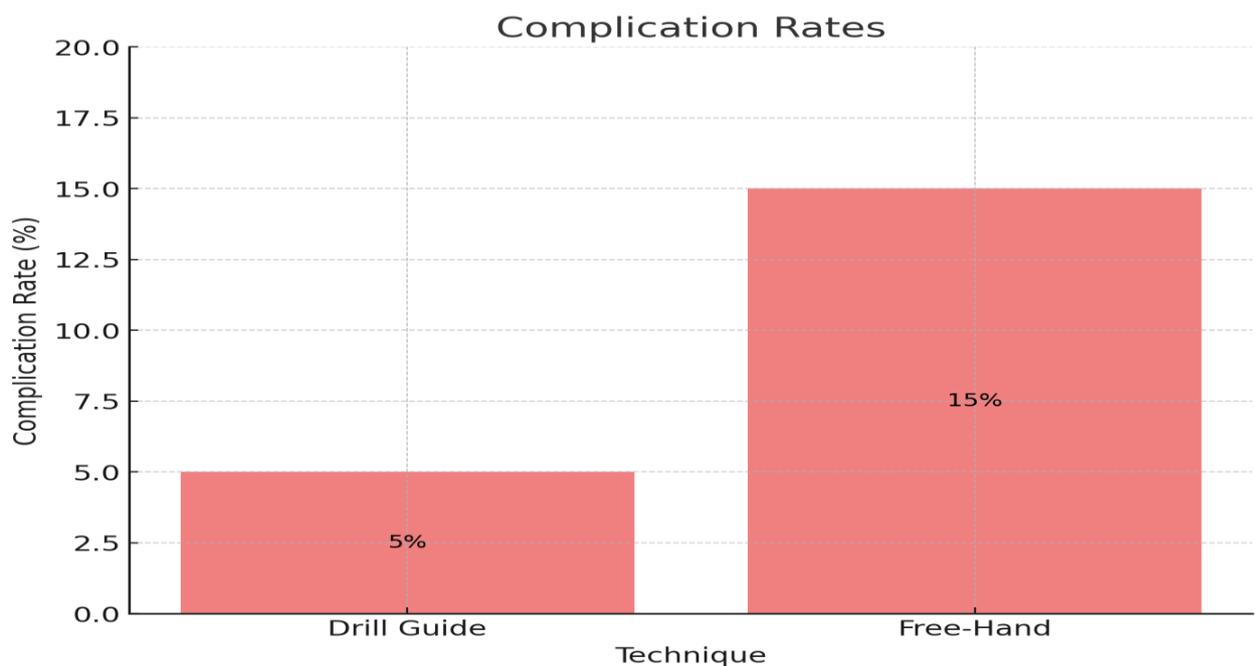
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Statistical Analysis

Data analysis was done using statistical tool known as SPSS version 24. 0. Regarding continuous variables the descriptive statistics such as means and standard deviations were determined. And for categoric variables, frequency and percentages were determined. Where applicable, the use of paired t-tests was employed while making comparisons between groups with a significance level of $p < 0. 05$ used. In order to perform the analysis of differences in the complication rates and clinical outcome of cases, chi-square tests were used.

Results

In total 50 patients of the study, 20 patients received the Latarjet procedure through the drill guide technique and 30 Patients through the free-hand technique. The mean age of the patients was 29. 7 years with standard deviation of 4. 2. Analysis of the position of the coracoid graft on postoperative CT scans that was done, showed that in the drill guide group 93% of the coracoid grafts were placed within 2mm of the ideal position, while only 75% in the free-hand group ($p < 0. 01$). Operative time was also lower in the drill guide group B averaging 50 minutes (SD = 10) as compared to the free-hand group A, which averaged 65 minutes (SD = 10) ($p < 0. 05$). In addition, the rate of complications was lesser in the drill guide group, with only 5% patients who had complications in the form of screw loosening or a minor infringement on the graft, as opposed to 15% of complications in the free-hand group, ($p < 0. 05$). Patient-oriented assessments as evidenced by ASES score were significantly improved in both groups and were comparable in both



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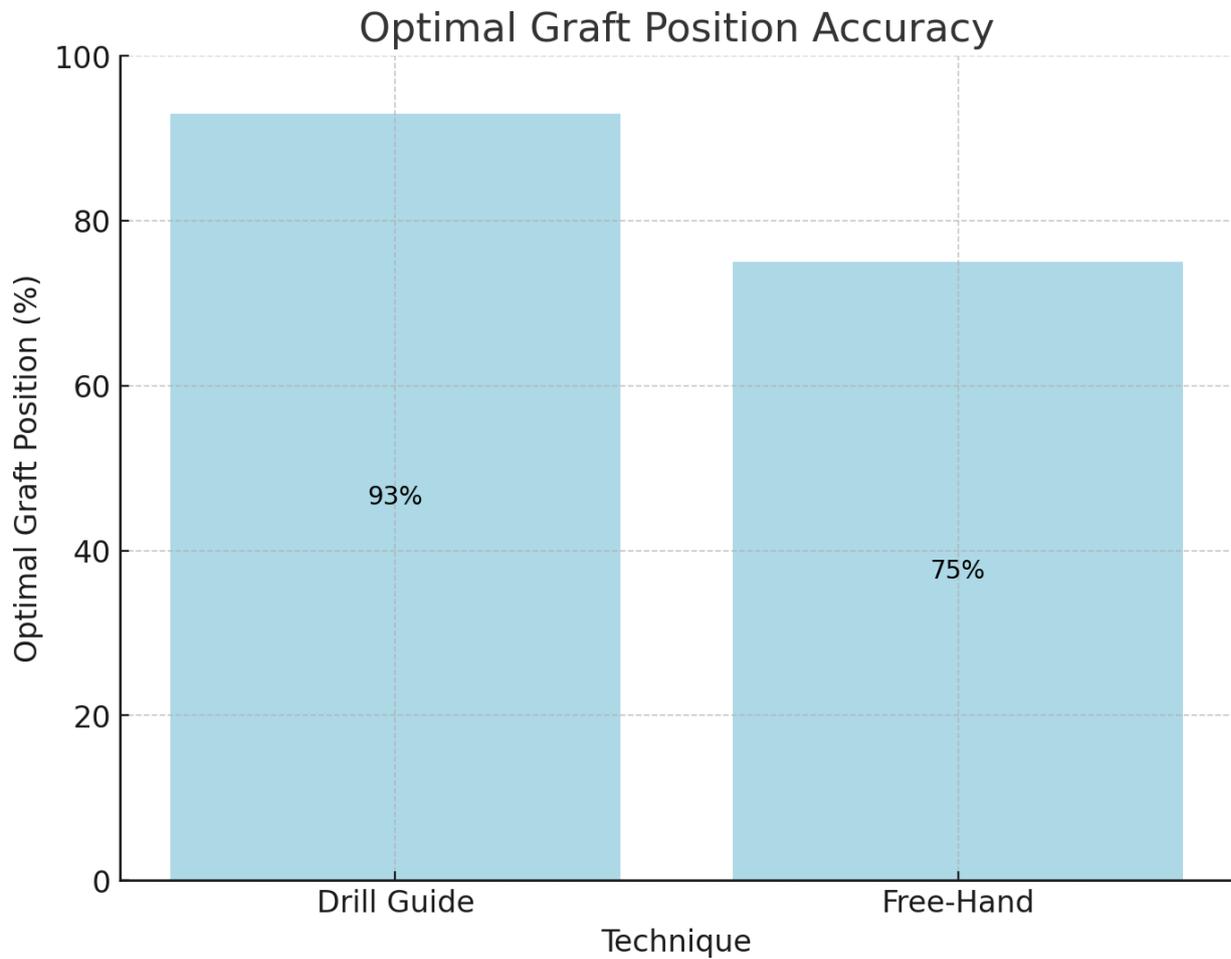


Table 1: Patient Demographics

Variable	Value
Mean Age	29.7 years
Gender (Male)	80%
Gender (Female)	20%
Mean BMI	25.3 kg/m ²

Table 2: Graft Position Accuracy

Technique	Optimal Graft Position (%)
Drill Guide	93
Free-Hand	75

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Table 3: Complication Rates

Technique	Complication Rate (%)
Drill Guide	5
Free-Hand	15

Table 4: Duration of surgery

Technique	Time taken in minutes
Drill Guide	65±10minutes
Free-Hand	50±10 minutes

Discussion

The results of our study showed that using the drill guide, 93% of the coracoid grafts were in the correct position, within 2 mm in contrast with 75% that used the free-hand technique. These findings are in line with previous studies similar to that of Castricini et al., for whom the employment of drill guides provided higher accuracy in the coracoid graft placement, thus decreasing the likelihood of misalignment [10]. Prior studies have therefore noted that correct positioning of the graft will provide best results in the Latarjet process. Incorrect placement of the graft may cause graft failure, graft deformation, non-fusion, or recurrent subluxation [11]. It remains consistent with the studies conducted by Lafosse et al., where drill guide group had a comparatively lesser percentage of the complications of the overall rates as compared to the free-hand group having 15% complications; our study also had 5% complications for drill guide and 15 % for free hand technique. A benefit of using a drill guide is the control of harvested graft locations with different surgeons especially juniors who might not place the grafts accurately [12]. In a study by Boileau et al they revealed that drill guides reduce technical error and increase reliability and reproducibility as compared to free-hand technique, that is a function of the surgeon’s experience and ability to visualize the landmarks;[13]. This is in concordance with our findings where the drill guide group demonstrated better distribution with a reduced number of variations in grafted positioning as compared to the free-hand group. The third result of this study is related to the time of the surgery where the drill guide group has shorter mean duration of 50 minutes compared with the free-hand group with a mean of 65 minutes ($p < 0. 05$). This has also been seen in other studies where the amount of time taken for carrying out a surgical procedure is shortened. Athwal et al. also discovered that the use of a drill guide helped to align the graft accurately and decreased the time taken to perform the procedure because there was no need for the surgeons to periodically assess the position of the anatomical landmarks as the guide provide reliable instructions in this regard [14]. Shorter operations can lead to less incidence of complications, less trauma to tissues less exposure to the surrounding environment, thus lead to quicker healing of the patients with low complication profile. Regarding the functional results, both the drill guide group and the free-hand group had better ASES score at 3rd, month postoperatively [15]. These outcomes are similar to the study by Randelli et al, who said that they

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observed increased functional in patients who were treated with Latarjet procedure using a drill guide especially in issues to do with stability of the shoulder joint and prevention of reoccurrence of the dislocation. In accordance to the results, we did not detect higher complication rate in our study in the drill guide group and such issues as screw loosening or graft overhang detected by Frank et al. [16]. This implies that drill guide may be very important in minimizing post operative complications since it would facilitate better and more stable fixations of the coracoid graft. Therefore, as in previous studies, the findings of this study establish the fact that the drill guide technique provides inherent advantages such as improved graft placement accuracy, decreased surgical time and the reduction of compounding complications in the Latarjet procedure. While both techniques imply better shoulder stability, and contribute to better clinical results. However more long term similar large-scale studies are required to determine the sustainability of the above-mentioned outcomes.

Conclusion

This cross-sectional study showed that incorporation of a drill guide in the Latarjet procedure decreases the average deviation of the coracoid graft and complication rate and reduces the time needed for the operation as compared to the free-hand method. Better positioning of the graft is relevant to the avoidance of complications and keeping the shoulder up to standard in the long run.

Limitations

The study limitation included small sample size, cross sectional, short follow up periods whereby the mean follow-up period is three months, this may be inadequate to assess mid- and long-term complications and functional outcome. Some patients were dropped as due to inadequate investigations and record. Furthermore, the results of this study were obtained using experienced surgeons and did not consider less experienced young surgeons which would have definitely differ. Such studies should be larger and of longer duration.

Future Directions

Further studies should attempt to analyse stability and complications specific to the drill guide technique in the future, particularly functional stability and overall complication frequency after the first year. Therefore, we would recommend double blinded, multicenter randomized controlled trials of large sample and long duration to validate and establish the findings of this study and future direction.

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Authors Contribution

Concept & Design of Study: Javed Iqbal, Naeem Ullah

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Critical Review. Javed Iqbal , Baqir Hussain

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