

**COMPARATIVE EVALUATION OF TITANIUM AND
BIORESORBABLE FIXATION IN LEFORT I OSTEOTOMY: A
RANDOMIZED CLINICAL STUDY**

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ANNOTATION

LeFort I osteotomy is a widely used surgical procedure for correcting maxillary deformities. Stable fixation is essential for maintaining postoperative skeletal positioning. Titanium plates provide excellent mechanical strength but remain permanently in the facial tissues and often require removal. Bioresorbable plates were developed to avoid long-term hardware retention, although concerns remain regarding their initial stability. This study compares titanium and bioresorbable fixation systems in patients undergoing LeFort I osteotomy. Clinical and radiographic evaluations were conducted to assess skeletal stability, postoperative comfort, and complications. The findings show that titanium fixation offers superior early stability, while bioresorbable fixation improves patient comfort and eliminates the need for secondary removal. Long-term skeletal stability was comparable in both groups, indicating that both systems are effective and should be chosen based on patient needs and surgeon preference.

LeFort I osteotomy remains one of the most important procedures in corrective maxillofacial surgery. The success of postoperative outcomes depends largely on the stability of internal fixation, which maintains the maxilla in its new position during bone healing. Titanium miniplates have long been recognized as the standard fixation method due to their high mechanical strength, reliability, and extensive clinical validation. Despite their advantages, titanium plates remain permanently in the facial skeleton unless surgically removed. Patients may experience palpability of plates, sensitivity during temperature changes, or soft-tissue irritation. These disadvantages have encouraged the development of alternative fixation materials that provide stability while reducing long-term complications.

Bioresorbable fixation systems are primarily composed of polylactic and polyglycolic acid polymers. These materials gradually degrade through hydrolysis, allowing complete absorption by the body and eliminating the need for plate removal. As interest in minimally invasive and patient-friendly techniques increases, bioresorbable systems have gained attention as a potential alternative to titanium. However, concerns remain regarding their mechanical strength, especially in the early

postoperative period, when the maxilla is susceptible to micromovements and relapse. This randomized clinical study compares the effectiveness of titanium and bioresorbable fixation systems in patients undergoing LeFort I osteotomy. All surgeries followed a standardized down-fracture technique, and patients were randomly assigned to the titanium or bioresorbable fixation group.

Clinical examinations and radiographic analyses were performed to evaluate postoperative stability, soft-tissue healing, complications, and patient satisfaction. The results indicate that titanium fixation provides stronger initial mechanical resistance, which is particularly important during the first month following surgery. Radiographic measurements demonstrated slightly greater early stability in the titanium group. However, long-term follow-up showed minimal differences in skeletal positioning between the two groups, indicating similar final outcomes. Occlusion remained stable in both groups, and no significant differences in relapse rates were observed. Patients in the bioresorbable fixation group reported higher comfort levels and an absence of long-term hardware sensation. Palpability was a common issue among titanium-treated patients, occasionally leading to elective removal of plates. Mild inflammatory episodes associated with polymer degradation were noted in the bioresorbable group; however, these were self-limiting and required no surgical intervention.

The findings support the use of either fixation system depending on the specific clinical scenario. Titanium fixation remains preferable for cases requiring maximum early stability, particularly in large skeletal movements or heavy functional loading. Bioresorbable fixation, however, offers significant advantages in terms of patient comfort and eliminates the need for secondary surgery. Given the comparable long-term results, the choice between the two systems should be based on individualized treatment planning that considers anatomical, functional, and patient-centered factors.

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