

# Effect of Injectable Platelet-Rich Fibrin on Diced Cartilage's Viability in Rhinoplasty

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## Abstract

Diced cartilage is one of the most widely used camouflage technique in rhinoplasty. Its variable resorption rate creates issues in postoperative time period. Platelet-rich fibrin is an autologous concentrated blood derivative containing growth factors that accelerate tissue healing. The authors evaluate the effect of injectable platelet-rich fibrin (I-PRF) on the viability of diced cartilage, which has been used for dorsum camouflage in rhinoplasty. Forty patients were randomly divided into two groups based on dorsal camouflage grafts: diced cartilage with I-PRF (study group) and diced cartilage without I-PRF (control group). Cartilage graft thickness was measured by linear superficial tissue ultrasound at the postoperative first week and the third month in both groups. The mean cartilage graft thickness loss between the first-week and third-month ultrasound measurements was  $0.58 \pm 0.21$  mm in the study group and  $0.82 \pm 0.35$  mm in the control group. There was significant volume loss in the control group. I-PRF was successful in reducing the resorption rate of diced cartilage on nasal dorsum by either increasing the viability or keeping its form. Sticky cartilage is an easily applicable and reliable technique that may be used to camouflage dorsal irregularities in rhinoplasty.

## Keywords

- ▶ cartilage viability
- ▶ diced cartilage
- ▶ nasal dorsum camouflage
- ▶ platelet-rich fibrin
- ▶ rhinoplasty

Dorsal irregularities are one of the most commonly encountered problems in rhinoplasty practice that may interfere with patient's satisfaction in the postoperative period. Camouflage of irregularities of either skin or the skeleton may be necessary. Many nasal camouflage techniques have been defined previously. Diced cartilage is one of the most widely used camouflage technique so far. It is reliable, pliable, and easy to apply.

Additionally, its biocompatibility is better than other alloplastic materials.<sup>1</sup> Some modifications have been defined, such as use with Surgicel (Ethicon) or temporalis fascia.<sup>2,3</sup> There are certain issues regarding the use of diced cartilage on nasal dorsum, especially its variable resorption rate.

Autologous concentrated growth factor enriched bone graft, also called sticky bone, was defined as an autologous material for repairing bone defects in dentistry. Autologous fibrin glue provides stabilization of the graft, and growth factors of plasma accelerate tissue healing and minimize bone loss during healing period.<sup>4</sup> Recently, Miron et al<sup>5</sup> described injectable platelet-rich fibrin (I-PRF) as a bioactive agent capable of stimulating tissue regeneration with higher concentrations of various growth factors. Öreroğlu et al<sup>6</sup> used a combination of diced cartilage, bone dust, and autologous blood glue in rhinoplasty, with encouraging postoperative outcomes. They used autologous fibrin glue similar to I-PRF with diced cartilage and bone dust as a structural graft in rhinoplasty.

This study aimed to evaluate the effect of I-PRF on the viability of diced cartilage, which has been used for dorsum

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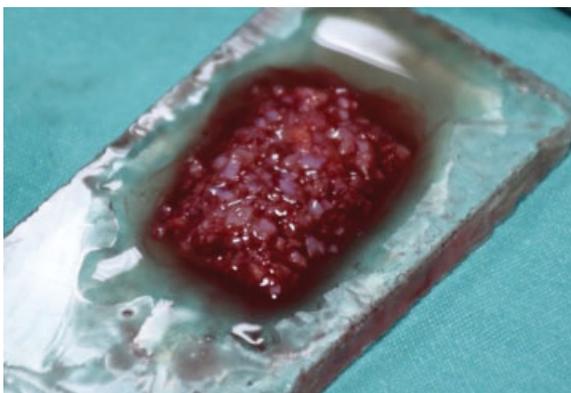
**Fig. 1** Collecting autologous fibrin glue layer.

camouflage in rhinoplasty. Diced cartilage with or without I-PRF has been applied as dorsal camouflage grafts randomly.

## Material and Methods

We conducted this prospective study on 40 patients who underwent open approach primary rhinoplasty between February 2018 and August 2018. All procedures performed in the study were in concordance with the ethical standards of the institutional and/or national research committee and the Declaration of Helsinki in 1964 and its subsequent amendments or comparable ethical standards. We obtained informed consent from all of the participants in the study.

Forty patients who underwent open approach primary rhinoplasty were randomly divided into two groups based on dorsal camouflage grafts: diced cartilage with I-PRF (study group) and diced cartilage without I-PRF (control group). Age, gender, comorbidities, trauma, and previous functional complaints were neither inclusion nor exclusion criterion. The same senior surgeon performed all operations through the open approach. We cut and excised Pitanguy's midline ligament and the scroll ligament in all cases. All patients were primary cases and had standard preoperative and



**Fig. 2** Mixing autologous fibrin glue with diced cartilage.



**Fig. 3** Stabilized and flexible diced cartilage graft.

postoperative facial photography for rhinoplasty. The nasal cast thermoplastic splint and nasal taping were removed at the end of the first postoperative week in both groups. There was an informed consent related to photography, including the permission for publication of all patients and the control group who were included in the study.

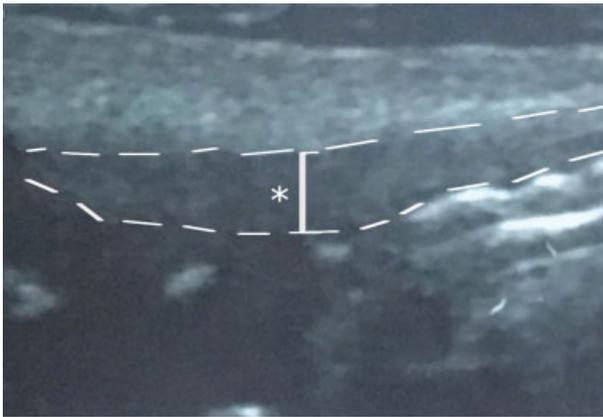
In the study group, sticky cartilage (diced cartilage with I-PRF) was used for nasal dorsum camouflage. The sticky cartilage protocol by Miron et al<sup>5</sup> was used. A venous blood sample was taken without anticoagulant in 10-mL sterile tubes, which are immediately centrifuged at 2,700 rpm for 2 minutes. We collected the upper layer of the tube and mixed it with diced cartilage grafts (►Fig. 1). After the polymerization process (5–10 minutes), fibrin network stabilized the diced cartilages (►Fig. 2). We laid the sticky cartilage over the bony dorsum and cartilage framework of the supratip area (►Fig. 3) (►Fig. 4). In the control group, we used diced cartilage graft without any supplement for nasal dorsum camouflaging. Cartilage graft thickness was measured by linear superficial tissue ultrasound at the postoperative first week and the third month in both groups. Cartilage graft was measured at the thickest region (►Fig. 5).

## Statistical Analysis

Statistical analysis was performed using SPSS (version 22.0, SPSS Inc.). Paired sample *t*-test or the Wilcoxon test was used for the analysis of the variables depending on the distribution pattern of the data. The Shapiro–Wilk test was used for determining the distribution pattern of the data. The distribution pattern of the mean skin thickness of all



**Fig. 4** Lying sticky cartilage over the bony and cartilage dorsum.



**Fig. 5** The ultrasonic view of the diced cartilage graft marked between the nasal dorsum and skin. Asterisk indicates the thickest part of the cartilage graft.

groups was parametric. Data were expressed as mean  $\pm$  standard deviation.

## Results

The mean ages of the study and control groups were 27.3 years (range 20–38) and 27.5 years (range 18–37 years), respectively. There were 11 males and 8 females in the study group, and 10 females and 9 males in the control group.

Regarding the first-week ultrasound measurement, the mean cartilage graft thickness on the nasal dorsum was  $2.38 \pm 0.58$  mm in the study group and  $2.13 \pm 0.54$  mm in the control group. Regarding the third-month ultrasound measurement, the mean cartilage graft thickness on the nasal dorsum was  $1.8 \pm 0.56$  mm in the study group and  $1.31 \pm 0.37$  mm in the control group. There was a significant difference between the first-week and third-month measures ( $p < 0.05$ ). The mean cartilage graft thickness loss between the first-week and third-month ultrasound measurements was  $0.58 \pm 0.21$  mm in the study group and  $0.82 \pm 0.35$  mm in the control group. There was significant volume loss in the control group ( $p < 0.05$ ) (**► Table 1**). Regarding complications, we encountered no complications in either group, including scarring, hematoma, infection, skin discoloration, and acne.

## Discussion

The diced cartilage is useful autologous graft for nasal dorsum camouflaging. It is pliable and applicable in most cases. How-

ever, some patients demonstrate cartilage resorption, which may end up with unpredictable irregularities during the postoperative period. Significant cartilage resorption rate has been reported with the Turkish delight (diced cartilage wrapped within Surgicel) technique.<sup>1</sup> Surgeons tried to reduce the unpredictable resorption rate of diced cartilage. Fascia envelope has been used for wrapping the diced cartilage.<sup>2</sup> This technique has been advocated to reduce the resorption rate at the expense of viability successfully. The camouflaging techniques are evolving, but there is no gold standard procedure for increasing viability and stabilization of the diced cartilage.

Alloplastic fibrin materials such as AlloDerm and fibrin glue have been used for increasing cartilage viability and stability.<sup>7,8</sup> Primary results were encouraging. However, the increased inflammatory process created controversies regarding their clinical use.

Diced cartilage without any supplementary material has a potential risk of producing irregularities itself. It may gather in a certain region and cause dorsal irregularities. Recently, Öreroğlu et al<sup>6</sup> defined the use of an alternative method for rhinoplasty. Autologous fibrin material was an applicable and simple method for increasing the stability of diced cartilages. It was a relatively sticky environment that kept the form of diced cartilage. Additionally, it had the potential of increasing the viability of cartilage by growth factors, which are naturally a composition of I-PRF. However, the viability of this combination remained uncertain.

I-PRF may have positive effects on reducing the inflammatory process in the postoperative period. Furthermore, growth factors of the autologous fibrin glue have the potential of helping the healing process. We hypothesized that growth factors of I-PRF and increased stabilization of diced cartilage with fibrin matrix might increase the viability of cartilage. We used an objective evaluation method for measuring cartilage graft's thickness in our study. The resorption of the diced cartilage volume was significantly lower in the study group compared with the control group in the 3 months. The postoperative complication rate of the study group was not different.

Potential mobilization of diced cartilage especially in the control group was one of the most important limitations of our study. We statistically analyzed the data using paired sample test to overcome the potential measurement mistakes due to different surgical techniques. Thus, each patient's resorption rate could be assessed. Ultrasound measurement has been done from the thickest subcutaneous cartilage over the bone. By doing so, we could repeat the measurement of the exact same region in 3 months.

**Table 1** Mean cartilage thickness (in millimeters measured with linear soft tissue ultrasound)

	Mean first-week cartilage thickness (mm)	Mean third-month cartilage thickness (mm)	Mean loss of cartilage graft thickness (mm)
Study group (N = 20)	$2.38 \pm 0.58$	$1.8 \pm 0.56$	$0.58 \pm 0.21$
Control group (N = 20)	$2.13 \pm 0.54$	$1.31 \pm 0.37$	$0.82 \pm 0.35$

## Conclusion

Our study is the first study that objectively and randomly evaluated the effect of I-PRF on cartilage viability in rhinoplasty. I-PRF was successful in reducing the resorption rate of diced cartilage on nasal dorsum by either increasing the viability or keeping its form. Sticky cartilage is an easily applicable and reliable technique that may be used to camouflage dorsal irregularities in rhinoplasty.

### Conflict of Interest

None.

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