

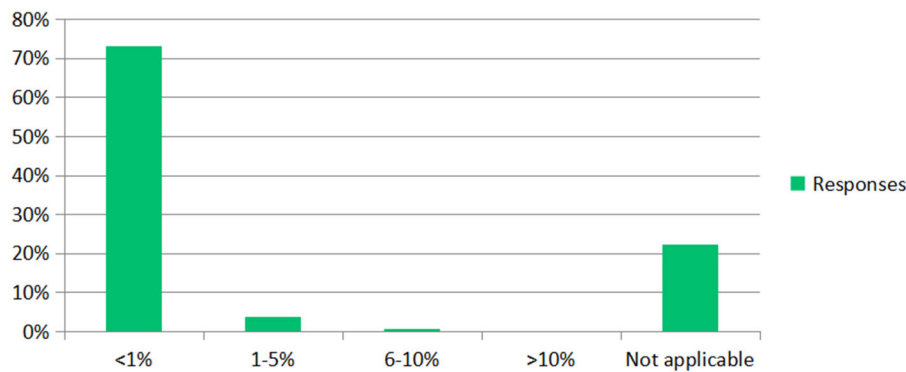








### What is the percentage of your patients getting a pneumothorax after autologous rib harvest?



**Figure 5.** The percentage of patients getting a pneumothorax post-op

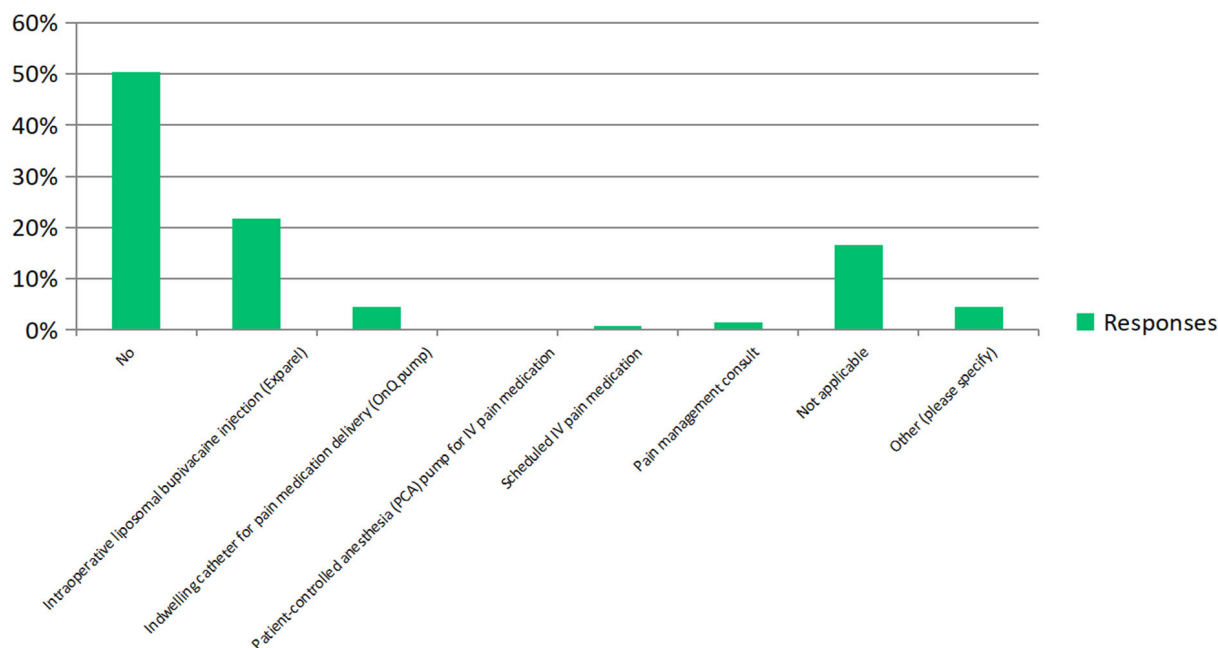
## DISCUSSION

Revision rhinoplasty routinely requires repairing structural deformities resulting from over-zealous resection of the bony-cartilaginous framework from prior procedures. This surgery is often technically challenging, particularly when cartilage material is limited. Autologous costal cartilage has been a workhorse for rhinoplasty surgeons since it provides the most abundant source of cartilage for graft design as well as being the most reliable for structural support<sup>[5]</sup>. However, the rate of warping was reported at 3.0%, reabsorption at 0.2%, infection at 0.5%, migration at 0.3%, unfavorable chest scar at 3.0%, and pneumothorax at 0% (0.13%-0.32%) according to a recent meta-analysis<sup>[6]</sup>. Given the convenience of irradiated cadaveric rib graft, the lack of donor-site morbidity and potential scarring, it is a popular alternative. Kridel *et al.*<sup>[7]</sup> reported the largest available case series to date in irradiated rib graft for 1,025 rhinoplasties with outcomes after long-term follow-up in some of the patients of greater than 10 years. Overall, the authors described the rate of warping at 3.25%, infection at 0.9%, and reabsorption at 1.2%. Alternatively, alloplastic materials have the advantages of being easy to use and readily available with an unlimited supply. Unfortunately, many of these alloplastic materials are fraught with long-term complications, such as infection, migration, extrusion and palpability. The risk of infection up to 12.6% and extrusion rate of 16.0% had been reported by a recent case series and meta-analysis by Loyo and Ishii<sup>[8]</sup>. Occasionally, the extrusion happened many years after implantation.

Our study demonstrated that autologous rib grafts were still commonly performed by facial plastic surgeons in the United States (US). However, as with most online survey studies, our study was limited by the small number of responses and user bias. Most surgeons preferred full-thickness rib graft harvest with a medium size (2-4 cm) incision. However, it was not surprising to see a trend towards “short-scar” technique with incision < 2 cm. The majority of the surgeons were not concerned about post-operative pulmonary complications as the incidence remained low. This corresponded to the low percentage of surgeons keeping patients overnight for observation or getting a routine chest X-ray post-operatively. As the opioid epidemic continues in the US, it was interesting to see most of the US facial plastic surgeons did not utilize any additional analgesia for rib grafts other than oral pain medications. Intraoperative liposomal bupivacaine injection at the surgical site that provides an opioid-free regional anesthesia, has gained some popularity as 21.8% of the survey responders incorporated it into their post-operative pain management. Indwelling catheter for pain medication delivery (e.g., bupivacaine) was also an option among the facial plastic surgeons, however, such delivery system would often require hospital monitoring which might negate its routine use.

Twenty eight percent of the responding surgeons reported harvesting rib grafts in an ambulatory or an office-based surgical facility compared to approximately 50% of them performing the procedure at a hospital

## Do you routinely utilize any additional analgesia protocol (other than oral pain medications) after autologous rib harvest?



**Figure 6.** Post-operative pain management

facility. There was less difference between in-office vs. ambulatory facilities (14.8%) than there was between in-office or ambulatory facility and a hospital (21.5%). This indicated that the decision of location choice was mainly on hospital vs. non-hospital facilities rather than ambulatory vs. office-based surgery centers.

In order to keep the survey simple, specific medical services available at non-hospital facilities were not solicited. These included the availability of X-ray, chest tube set, thoracic surgeons and the proximity to a hospital for transfer and admission. This is a significant limitation of the study. In addition, our online survey was distributed via email by the AAFPRS which might have explained the lower response rate when mass emails were frequently ignored by members.

A suggestion to future study should include a discussion of the intervention performed by the surgeons if an air leak is found or suspected intraoperatively since a formal chest tube is rarely needed. Typically, an intraoperative air leak can be detected by a visual rent in the posterior perichondrium and pleura. Most surgeons also have the anesthesia provider perform a Valsalva maneuver while looking for air bubbles forming under saline irrigation at the rib graft harvest site. If an air leak is detected, the next step will be to first place a small red-rubber catheter through the pleural defect, temporarily secure it with a purse-string suture in multiple layers, then withdraw the catheter under suction. Patients are then observed for shortness of breath and an elective chest X-ray is obtained in the post-anesthesia care unit, at a nearby radiology facility or emergency department. A small pneumothorax may be seen in those situations and treatment often is observation. In rare cases, insertion of a small suction catheter (much smaller than a conventional chest tube) may be required and placed by a thoracic surgeon, which will be left in place for a few days.

In conclusion, we summarized the current practice trend of US facial plastic surgeons in autologous costal cartilage harvest for rhinoplasty. The very low percentage of pneumothorax after rib harvest and the use

of post-operative advanced analgesic control techniques remained low and did not warrant routine post-operative chest imaging or overnight observation. Two thirds of the US facial plastic surgeons continued to perform their rib harvest in a hospital setting.

## **DECLARATIONS**

### **Authors' contributions**

Made substantial contributions to conception and design of the study and performed data analysis and interpretation: Olcott CM, Pearlman SJ

### **Availability of data and materials**

Data can be requested from the corresponding author.

### **Financial support and sponsorship**

None.

### **Conflicts of interest**

All authors declared that there are no conflicts of interest.

### **Ethical approval and consent to participate**

Not applicable.

### **Consent for publication**

Not applicable.

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