

Social Perception of Reconstruction following Orbital Exenteration

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Background: Orbital exenteration, the removal of the entire globe, eyelids, and orbital content, is indicated in extensive neoplastic disease involving the orbital region. Although a functional reconstruction of orbital exenteration defects is mandatory, aesthetic concerns need to be considered. Facial disfigurement following reconstructive surgery often leads to great discomfort and social retirement, which can limit social interaction. The aim of this study was to explore how the society perceives the aspect of patients who underwent orbital exenteration and subsequent reconstruction, comparing two different types of reconstruction: standard anterolateral thigh (ALT) or “sandwich” fascial ALT (SALT) free flap.

Methods: An online survey was created based on four questions regarding the perception of reconstruction (discomfort at looking at that patient, perception of unhealthiness, hypothesis of social life impairment, etc); five possible answers were provided, ranging from “completely” to “not at all.” The survey was administered to the general population and to medical students.

Results: In total, 255 people participated to the survey (130 medical students and 125 people of the general population); a total of 245 surveys were considered eligible (10 were incomplete and then discharged). Statistical significance was found ($P < 0.001$) regarding the better overall appearance of the SALT group over the ALT one.

Conclusions: After analysis, the surgical outcome after SALT reconstruction has been found to be less disruptive in both groups, due to a reduced scar burden and a more pleasant orbital pocket. Our results encourage more research in the field of postexenteration reconstruction to achieve more aesthetic and social acceptability. (*Plast Reconstr Surg Glob Open* 2021;9:e3883; doi: 10.1097/GOX.0000000000003883; Published online 26 October 2021.)

INTRODUCTION

Orbital exenteration is classically defined as the removal of the entire globe, eyelids, conjunctiva, and orbital content, including the periosteum.¹ In subtotal exenteration, the globe and the adjacent tissues are removed, whereas total exenteration involves the excision

of the entire orbital content with the possibility of sparing the eyelids. In extended or radical exenteration, all the orbital tissues, including adjacent structures such as bone, skin and muscular tissue, are removed.^{2,3}

Extensive neoplastic disease involving the orbital content represents the most frequent indication. These malignancies can directly originate from orbital structures or can spread to the orbit from the adjacent skin, sinus, or brain.^{4,5}

Leaving an open cavity permits a better tumor surveillance and prosthesis allocation. Nevertheless, in most cases, it is not desirable to avoid defect closure, owing to the risk of surrounding tissue contracture and wound-healing disorders, such as orbital fistulas and intracranial infection.^{4,6} Furthermore, a robust coverage is required in case of adjuvant radiation therapy, to minimize the risk of postoperative osteoradionecrosis and tissue distortion.⁷⁻⁹

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For this purpose, several locoregional and free flaps have been employed,^{10,11} such as the temporalis muscle flap,¹² the rectus abdominis free flap,¹³ and the anterolateral thigh (ALT) free flap¹⁴ (Fig. 1).

The ALT free flap represents our preferred reconstructive choice, considering its many advantages. First of all, the pedicle length, the minor donor site morbidity, and the possibility of harvesting large amount of tissue make it a particularly favorable flap. Furthermore, its versatility has allowed us to experience different variations in recent years. Among all, the chimeric ALT free flap^{14,15} is used for complex orbital defects, and the “sandwich” fascial ALT flap (SALT)^{16,17} (Fig. 2) and a multilayer fascia ALT free flap were designed to ameliorate the postoperative aesthetic appearance.

Although a functional reconstruction of orbital exenteration defects is mandatory, aesthetic concerns need to be managed as well. Facial disfigurement following reconstructive surgery often leads to stigma in survivors, which can limit social interaction particularly with regard to strangers and acquaintances.¹⁸ In the literature, very few works deal with observers’ perceptions concerning patient appearance, perceived patient health, and observer comfort. Kuiper et al investigated the perception of the patients after surgical exenteration, even if a survey (including several inquiries) was sent only to students enrolled at the University of Iowa Carver College of Medicine¹⁹ and not to the general population. With this study, our purpose was to explore and compare perceptions deriving from two different categories of third-party observers placed in front of pre and postoperative photographs of patients

who underwent an orbital exenteration with subsequent reconstruction with ALT free flap and SALT free flap, respectively.

MATERIALS AND METHODS

An observational study was conducted enrolling 31 patients who underwent a free flap reconstruction following orbital exenteration due to orbital, periorbital, or head and neck malignancies. All patients were treated between July 2013 and May 2019 at the ASST Settelaghi, by the Division of Otorhinolaryngology, and the Plastic Reconstructive and Aesthetic Surgery Department (Department of Biotechnology and Life Sciences, University of Insubria, Varese, Italy). In all patients, a preoperative imaging study was performed, including maxillofacial CT or MRI, to precisely evaluate the degree of tumor invasion and the involved adjacent structures. To give the correct diagnostic therapeutic framework, a multidisciplinary approach to the treatment of these patients was performed.⁵ All the patients were eligible for an orbital exenteration due to the invasion of the orbital cavity and the malignancy of the tumor. Due to the necessity of reconstructing the soft tissue, an anterolateral flap was planned for all the patients, in the classical fascio-cutaneous/sovralfascial or SALT based on the sizes and aspect of the final defect. The flap was designed and harvested in such a way that a customized and appropriate coverage of the entire defect was accomplished. A modified radical or a selective neck dissection was simultaneously conducted in case of preoperatively established lymph node metastasis of the cervical region.



Fig. 1. A, Preoperative view of an 82-year-old female patient with a lower left eyelid melanoma (pT4N0) who underwent an orbital exenteration extended to the left nasal bone and ethmoid bone in February 2017. B, Postoperative result after 15 months from ALT free flap reconstruction.



Fig. 2. A, Preoperative view of a 73-year-old patient with a right orbital-sinonasal intestinal type adenocarcinoma (pT4bN1, G3) who underwent a transnasal excision, a right orbital exenteration, a bilateral transnasal craniectomy, and a right selective neck dissection in March 2018. B, Postoperative view after 7 months from SALT free flap reconstruction and adjuvant radiotherapy (IMRT 50-44 GyE).

Postoperative clinical and Doppler monitoring was performed for all flaps. After discharge, regular follow-up was carried out for all patients both at the plastic surgery and ENT clinics.

A complete photographic record was made for all patients with their prior consent. Preoperative, intraoperative, and postoperative times were properly documented to compare the different phases of each.

The 31 patients who underwent reconstruction with ALT free flaps (20) and SALT free flaps (11) were shown to the study participants. These photographs were included in an online survey (<https://www.surveymonkey.com>) based on the model developed by Kuiper et al,¹⁹ who investigated observer comfort, least bothersome appearance, patient health, and social appearance through four questions. Nevertheless, our survey was proposed to two different observational groups: group “A” (which included the general population, individuals from all backgrounds, sexes, ages, and cultural levels) and group “B” (comprising first to sixth-year medical students at the University of Insubria, Varese). A survey link was sent to each member of the two groups, to answer anonymously. The survey was organized into four questions as in Kuiper et al model, providing five possible answers for each question: “completely,” “very much,” “moderately,” “somewhat,” and “not at all.”

The entire text of the four proposed questions was as follows:

- Question 1 (Q1), observer comfort: How uncomfortable would you be looking at the patient’s face during social interaction?
- Question 1 integration (Q1i): If you answered 5 (completely) or 4 (very much). Why did you feel uncomfortable?

- Missing eye
- Missing symmetry
- Face distortion
- Not sure about what bothers me

- Question 2 (Q2), least bothersome: How much does the post-exenteration socket bother you?
- Question 3 (Q3), patient health: Do you feel like the appearance of the patient’s face makes them unhealthy?
- Question 4 (Q4), social appearance: Do you feel the appearance of the patient’s face would limit their social or professional activities?

We assumed that the patients reconstructed with a SALT free flap would have higher observer comfort and patient health and lower least bothersome and social appearance scores. Furthermore, we wanted to test if there were any differences in terms of response between group A and group B.

Statistical analysis was performed with SPSS Statistics software (version 24.0, Microsoft Windows). For each answer, a score ranging from 1 (“not at all”) to 5 (“completely”) was assigned. Wilcoxon signed-rank test was employed to compare the two reconstructive methods per each question, and Mann-Whitney test was used to analyze data between group A and group B. A *P* value less than 0.05 was predetermined to indicate statistical significance.

RESULTS

Overall, 255 people were involved in the survey, of which 130 were medical students (aged 20–25 years, equally distributed between men and women) and 125

were members of the general population (aged 18–65 years, equally distributed between men and women). Ten surveys were rejected because they were only partially completed. Hence, a total number of 245 surveys (124 medical students and 121 members of general population) were considered. The summary of the answers provided, and the relative percentages were collected and reported in the following table and graph formats (Table 1) (See figure, Supplemental Digital Content 1, which displays the results of the survey: the summary of the answers provided to the questionnaire and the relative percentages. <http://links.lww.com/PRSGO/B813>.)

In observers, data analysis showed higher observer comfort, lower least bothersome, higher patient health, and lower social appearance scores for the SALT reconstructed patients compared with the ALT ones. These values were expressed as median (Q1–Q3) with a statistical significance ($P < 0.001$) found both for the total sample and for the two groups analyzed separately (Table 1).

Observers who experienced a certain grade of discomfort regarding the appearance of the patients (Q1) reported that the awkwardness was mainly related to missing eye, missing symmetry, face distortion, not sure about what bothers me, and so on. The ALT group was found to generate a higher level of discomfort in the observers when compared with the SALT.

Concerning response percentages in group A, different absolute values were observed compared with group B, even though there was substantial agreement in the evaluations. In regard to ALT patients, subgroup analysis data revealed a more favorable assessment from medical students relative to observer comfort and least bothersome, with a statistical significance of a P value less than 0.05. Furthermore, the SALT social appearance was considered more favorably by group A ($P < 0.05$) compared with group B.

DISCUSSION

Diagnosis and surgical treatment of head and neck tumors lead to a significant impact on patient quality of life. Advancements in reconstructive surgery have also been achieved, thanks to the advent of the ALT free flap, originally described by Song et al in 1984.²⁰ Although the ALT flap has become the workhorse for most head and neck soft-tissue reconstruction, some disadvantages must be considered. First of all, aesthetic outcome is often suboptimal, as there is usually a marked color mismatch.

Furthermore, the flap is often too bulky and over time leads to a ptotic appearance, precluding the possibility of prosthetic rehabilitation. Subsequent procedures of debulking are therefore needed to reduce flap thickness and allow prosthesis allocation.^{21,22}

To overcome such limitations, the SALT flap was described in 2017 by our group.¹⁶ The flap is harvested from anterolateral thigh region and is made up of superficial fascia, subscarpal fat, and deep fascia. At the inset, it is turned upside down, so that the undersurface of the deep fascia faces outward. The deep fascia is secured to the dermis of the recipient site and the microsurgical anastomoses are performed. Thereafter, a full-thickness skin graft from the supraclavicular region or a dermal substitute is applied. In this way, a subsequent debulking procedure is not required and an improved color match is obtained. Very few comparisons have been made in the literature between ALT and SALT flaps, as the latter has only recently been described.¹⁷ Undoubtedly, a thinner flap has the added benefit of a better adaptability to previously excised structures and of a more anatomical reconstruction of the orbital pocket. Compared with the standard or with the suprafascial ALT flap, the SALT flap generally does not need secondary surgical thinning, allowing for a one-step procedure before the socket positioning. In addition to such surgical advantages, with our survey we wanted to assess whether there were also psychosocial benefits, with questions regarding impressions and evaluations of external observers, unaware of patient’s medical history.

We therefore investigated the following four areas: observer comfort, least bothersome, patient health, and social appearance. For each question, the observers were able to respond with a judgment scale of 1 (“not at all”) to 5 (“completely”), faced with each photograph. Data analysis has revealed that SALT flap results in higher observer comfort, lower least bothersome, higher patient health, and lower social appearance scores compared with the ALT flap ($P < 0.001$). The hypothesis of this study was therefore confirmed, both considering the total sample and the two groups separately.

The analysis conducted showed that observer comfort and least bothersome for the ALT patients were more favorably assessed by medical students compared with general population, with a statistical significance of P value less than 0.05. Better judgments for the SALT patients’ health were given by general population, when

Table 1. Values Expressed as Median (I–III quartile)

		Q1 Observer Comfort		Q2 Least Bothersome		Q3 Patient Health		Q4 Social Appearance	
		ALT	SALT	ALT	SALT	ALT	SALT	ALT	SALT
Total sample (n = 245)	Median	3 ($P > 0.7$)	3 ($P > 0.001$)	3 ($P > 0.2$)	2 ($P > 0.001$)	3 ($P > 0.3$)	3 ($P > 0.001$)	4 ($P > 0.4$)	3 ($P > 0.001$)
	I–III Quartile	2–3	2–4	2–4	2–3	3–4	2–3	3–4	2–4
General population (n = 21)	Median	2 ($P > 0.2$)	3 ($P < 0.001$)	3 ($P > 0.3$)	3 ($P < 0.001$)	3 ($P > 0.2$)	2 ($P < 0.001$)	4 ($P > 0.2$)	3 ($P < 0.001$)
	I–III Quartile	2–3	2–3	2–4	3	3–4	2–3	3–4	2–4
Medical students (n = 124)	Median	3 ($P < 0.05$)	3 ($P < 0.001$)	3 ($P < 0.05$)	2 ($P < 0.001$)	4 ($P > 0.3$)	3 ($P < 0.001$)	4 ($P > 0.4$)	3 ($P < 0.05$)
	I–III Quartile	2–3	3–4	2–4	2–3	3–4	2–4	3–4	2–4

If present, statistical significance ($P < 0.05$ or < 0.001) is evidenced next to median value.

compared with medical students ($P < 0.05$). Hence, the secondary hypothesis was only confirmed for ALT observer comfort and least bothersome. The limits of the study are represented by a relatively modest sample size (especially in the population group).

We hypothesized from the aforementioned data that medical students were more psychologically prepared to view illness, scarring, and amputation, probably due to their education, cultural background, and environment. Students appeared to be less troubled by patient's appearance, unlike the general population. Less medical expertise could result in a more severe judgment concerning discomfort: the observer could consider the relevant and disfiguring face scarring as a transmissible disease that may represent a threat to himself.

Similar views between the two groups for patient health and social appearance suggest that, for both groups, such a drastic therapeutic decision was considered harmful for the patient but harmless for the observer. Similar considerations apply to SALT patients, analyzing data from both groups. Specifically, for the SALT patients' health, a more favorable assessment was given by the general population, with a significance of P value less than 0.05. Kupier et al have already tested medical students' reactions, narrowing it down to subjects who perceived patient's medical history, even assuming that the judgment could be affected by cultural and educational background. Nevertheless, he could not demonstrate this hypothesis, given the lack of a comparison sample with characteristics specific for the general population. Extending the sample, and collecting responses and keeping them divided between the two groups, we have partially succeeded in confirming this hypothesis.

CONCLUSIONS

Diagnosis of a head and neck tumor represents a shocking event for the patient, given its visibility. Orbital exenteration is considered as the last therapeutic chance for most patients. Facial stigma in survivors is not a negligible factor because it often leads to psychological and social concerns. Showing the reconstructive results of both techniques, the surgical outcome after SALT reconstruction has been found to be less disruptive in both groups, due to a reduced scar burden and a more pleasant orbital pocket. The results obtained can be considered satisfying; however, additional research in the post-exenteration reconstruction field are needed, either focused on the implementation of the surgical SALT technique or new studies aimed at analyzing observers' perceptions. Specifically, several ALT and SALT patients could be compared, belonging to the same genus and with similar anthropometric characteristics. Last but not least, more surveys could be developed with questions aimed at the evaluation of further details related to reconstructive outcome (ie, flap color or facial harmony), stratifying the results according to social and cultural features of the survey participants.

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This study was designed and registered within the internal database held in the Microsurgery and Hand Surgery Unit, ASST "SetteLaghi," University of Insubria, Varese, Italy. All patients filled an informed valid consent before the surgery. This study was performed in accordance with the ethical standards of the 1964 Declaration of Helsinki as revised in 2000. The study was registered within the internal database of audits held in the Microsurgery and Hand Surgery Unit, ASST "Settelaghi," University of Insubria, Varese, Italy and the hospital institution accepted the publication of the data obtained and previously presented in the clinical audit section.

PATIENT CONSENT

The patients provided written consent for the use of their images.

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