

Secondary Autologous Fat Grafting for the Treatment of Chin Necrosis as a Consequence of Prone Position in COVID-19 Patients

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Summary: Due to the spread of the coronavirus disease 2019 pandemic, an increasing number of ill patients have been admitted to intensive care unit requiring mechanical ventilation. Although prone positioning is considered beneficial, long periods in this position may induce important complications, including pressure ulcers in high-risk and uncommon body areas. We report five cases of pressure ulcer necrosis of the chin in coronavirus disease 2019 patients as a consequence of mechanical ventilation in prone positioning using autologous fat grafting (AFG) as a secondary technique. A series of five patients with secondarily-healed chin necrosis treated by AFG between February and June 2020 were reviewed. All patients had been treated initially with surgical debridement followed by conservative treatment. Secondary AFG was performed to reduce patient's pain, improve chin contour-projection, and minimize cosmetic sequelae and scarring. Patient satisfaction was assessed using a five-point Likert scale (0–4). Vancouver scale was used to evaluate the chin scars clinically. The average amount of fat injected into the chin area was 8.1 ± 2.0 ml. At 6-month follow-up, all patients were mostly satisfied (average Likert-scale 3.2 ± 0.4). Based on the Vancouver scale, improvement of the chin scar from 9.5 ± 0.8 to 4.7 ± 0.8 was found. We report a positive experience with secondary AFG for correction of painful and unaesthetic scarring and contour abnormality following surgical debridement and secondary-intention healing of chin pressure ulcers. (*Plast Reconstr Surg Glob Open* 2022;10:e4705; doi: 10.1097/GOX.0000000000004705; Published online 18 November 2022.)

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a potentially devastating infectious respiratory illness¹ that can require intensive care treatment due to severe acute respiratory distress syndrome (ARDS). Italy was the first country in Europe affected by the COVID-19 pandemic, and it has placed an unprecedented strain on the Italian health systems.^{2,3} Rate of admission to the intensive care unit (ICU) has been reported between 5% and 12% of the total number of cases.⁴ Critical care guidelines and research evidence recommend prone positioning more than 16 hours per day for adult patients with ARDS related to severe COVID-19 infection.^{5,6} Pressure ulcers are a well-recognized and

most frequent complication of this rescue treatment.^{7–10} Etiological factors of these injuries include (1) duration and amount of pressure, (2) friction or shearing forces, and (3) tissue perfusion pressure.¹¹ In severe cases, pressure injuries can culminate in pressure necrosis. In this article, the authors present their clinical experience with patients with COVID-19 treated in the ICU with prone mechanical ventilation who developed chin pressure injuries. This article summarizes the management by the plastic surgery team, including the initial surgical debridement followed by conservative treatment and secondary autologous fat grafting (AFG).

MATERIAL AND METHODS

A total of five patients treated in the ICU for severe respiratory complications of COVID-19 with chin pressure injuries were referred to the plastic surgery team between February and June 2020. Patients were initially treated with surgical debridement followed by conservative treatment. AFG was used in patients with secondarily-healed wounds in the chin as a secondary-revision procedure to

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improve contour defects and reduce scar contracture and pain.

Standard Coleman technique¹² of AFG was performed under local anesthesia and sedation on an outpatient basis. A tumescent solution containing 0.5% lidocaine and 1:200,000 of adrenaline was infiltrated into the donor sites. Fat was harvested from the lower abdomen or thigh using a two-hole 15-cm blunt-tipped cannula connected with a 10-ml syringe. Then, centrifugation at 3000 rpm for 3 minutes was performed. Through 2-mm incisions into the chin area, a blunt one-hole infiltration cannula, 17 gauge, was used to inject the purified fat with a 1-ml syringe. Fat was injected approximately 0.1 ml with each pass of the cannula within the subcutaneous tissue using multiple tissue planes and tunnels.

After 6 months of the surgical procedure, patient satisfaction was assessed using a five-point Likert-scale based on scar appearance, chin contour-projection, and pain from 0, very dissatisfied to 4, very satisfied. The Vancouver Scar Scale¹³ was used preoperatively and 6 months after AFG to evaluate the improvement of the chin scar clinically. This article conforms to the Declaration of Helsinki. Informed consent was obtained from the patients included in the study.

RESULTS

We treated five COVID-19 patients who developed necrotic pressure injuries in the chin (Table 1). The average size of the pressure ulcers was 19.4 cm² (range, 11.3–26 cm²). All patients were men, with a mean age of 65 (55–77) years, and a mean body mass index of 28 (25–31) kg/m². The average severity scores of SAPS II¹⁴ and SOFA¹⁵ at ICU admission were 36 and 4, respectively. Regarding the severity of the pressure injuries, three patients presented stage II and two patients at stage III according to the National Pressure Ulcer Advisory Panel.¹⁶ Two patients presented with concomitant pressure ulcers on the face: one on the forehead and one on the cheek. Pressure ulcers in the chin area were discovered on average 7 days after admission to the ICU. Following tissue viability, nurse, and plastic surgery consultation of these patients who were developing chin pressure ulcers, the chin, with a necrotic dark eschar, was surgically debrided in bed. Secondary wound healing from the periphery using paraffin gauze and hyaluronic acid/collagenase ointment (Bionect Start) occurred uneventfully in four patients at an average of 2 months. One patient developed a large amount of fibrin and infection and was treated with chemical debridement with collagenase + chloramphenicol cream (Irujol 1%),

Takeaways

Question: Is autologous fat grafting a useful procedure to improve the chin contour and projection and minimize scarring of COVID-19 patients with chin ulcers as a consequence of prone position previously treated with surgical debridement?

Findings: An improvement of patient's pain, chin contour, and scarring following fat grafting was obtained. At 6-month follow-up, patients were mostly satisfied.

Meaning: Fat grafting is a useful secondary-revision technique to address chin projection, contour abnormality, and scarring following initial surgical debridement and secondary healing of chin ulcers.

healing by secondary intention in 3 months. At an average of 6 months following complete healing, patients underwent AFG. The average amount of fat injected into the chin unit was 8.1±2.0 ml. There was no postoperative bleeding, no major infection, and no subcutaneous cysts (Fig. 1).

At 6-month follow-up, all patients were mostly satisfied regarding the chin contour and scarring (average Likert-scale 3.2±0.4), and none of the patients complained of pain. Based on the Vancouver Scar Scale, improvement of the chin scar from 9.5±0.8 (range, 8–10) to 4.7±0.8 (range, 4–6) was found.

DISCUSSION

In this small case series, we investigated five invasively ventilated patients with respiratory failure due to COVID-19 treated in the ICU with the use of prone positioning who developed chin pressure ulcers. During the first peak of the 2020 COVID-19 outbreak, an unprecedented number of patients presenting severe ARDS required prone therapy to maximize the mechanical ventilation.¹⁷ However, several complications can be seen with prone positioning,^{18–20} including pressure sores.^{7,8,10} These injuries are caused by long-term exclusion of blood flow to tissues due to unrelieved pressure, with or without friction and shear, on soft tissues and bony prominences for a long period of time. Recently, Ibarra et al²¹ showed that the total number of days under prone position maintained for more than 24 hours is the most relevant risk factor associated with pressure sores. Rolling the patient intermittently reduces pressure in high-risk areas with routine assessment of the skin and use of proper pressure-redistribution surfaces.²²

Table 1. Demographics and Surgical Details of Patients with Chin Ulcer Necrosis Who Underwent Secondary Autologous Fat Grafting

Patient Number	Age (Years)	BMI (kg/m ²)	Ulcer Size (cm × cm)	Healing Time (Days)	NPUAP Stage	Timing of Fat Injection (Weeks)	Amount of Fat (ml)
1	77	25	4×3	55	II	43	8
2	65	27,3	2,5×4,5	59	II	43	5
3	68	31	4×6,5	87	III	56	10,5
4	55	28,1	4,5×5	62	II	48	7
5	60	28,6	5×5	65	III	44	10

NPUAP, National Pressure Ulcer Advisory Panel.

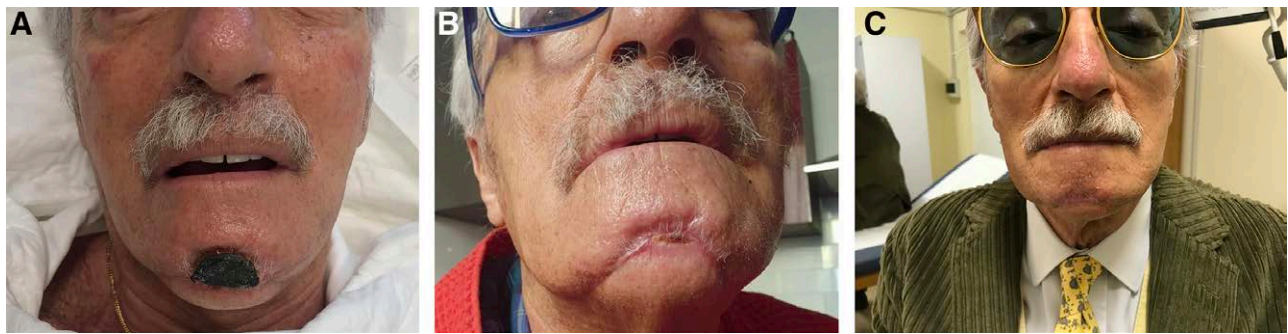


Fig. 1. Patient 1. A, A 77-year-old man was referred to the plastic surgery team for a 4 × 3 cm necrotic pressure injury in the chin as a consequence of mechanical ventilation in prone position for COVID-19 interstitial pneumonia. B, Surgical debridement of the necrotic chin eschar was performed, followed by conservative treatment with paraffin gauze, daily heliotherapy, and hyaluronic acid/collagenesis ointment. Secondary healing was achieved in 55 days. C, Six months after the debridement, patient complained of a painful and unaesthetic scarring area with grade 10 on the Vancouver Scar Scale. Scar release and autologous fat grafting of 8 ml of pure fat were performed. After 3 months, the patient was painless, the scarring area was movable on depth plans with improved chin contour and projection with a grade 4 on the Vancouver Scar Scale.

In our study, following surgical debridement of necrotic eschar in the chin and conservative treatment, an average time of 2 months and 2 weeks was needed for complete healing, leaving an area of patchy alopecia and a scar. Skin soft tissue defects within the chin unit are usually treated through local flaps, including advancement, bilobed, rhomboid, platysmal myocutaneous, or submental flaps.²³ Compared with secondary-intention healing, skin flaps show several advantages, including faster healing, better cosmetic result, and fewer medications needed.^{24,25} Nevertheless, patients affected by COVID-19 presented poor clinical condition and, therefore, conservative management of the wounds is generally suggested. Minimal and serial debridement with secondary-intention healing allows for saving vital tissue while waiting for a precise necrotic demarcation. This can impact the cosmetic result, leaving an area of scarring and patchy alopecia. Therefore, we believe that AFG can play a relevant role as secondary-revision technique in the final outcome of these patients to improve the cosmetic results.²⁶ Fat grafting has been largely used in scar's therapeutic patch since it was first described.^{27,28} Hence, it can be used not only to fill atrophic tissues, but also to reduce scar retraction and contracture as regenerative medicine.^{29–32} Fat placed around the nerve could avoid the recurrence of scar contracture, and this condition could improve patients' pain.³³ Chin fat grafting is largely used in aesthetic surgery with low incidences of complication.³⁴ The possibility of speeding up wound healing by performing fat grafting before wound closure is described in the literature.^{35–37} We agree that fat grafting would be an interesting strategy as an adjuvant treatment to avoid scar contracture and reduce pain; however, in our patients, we avoided giving additional surgical stress to patients who required mechanical ventilation in the ICU for COVID-19 complications. Instead, we preferred to perform secondary AFG when patients' conditions were settled to correct and improve the chin scar. We experienced an improvement of chin contour and projection, scarring, and reduction of pain following AFG. Our results are in agreement with the literature. Several authors demonstrated efficacy of AFG in tissue repair, analgesic effect, and reduction of functional limitations.³³ However, there are some authors who suggest that

there is no effectiveness of AFG in scar treatment. Brown et al³⁸ demonstrated no statistical evidence between AFG and saline injection, but this result could be conditioned by the low number of patients in the study.

CONCLUSIONS

During the COVID-19 pandemic, pressure injuries of the chin in patients with ARDS have been a common phenomenon in patients ventilated in prone position. In this article, we wish to propose AFG as a useful secondary-revision technique following surgical debridement and secondary-intention healing of chin ulcers for decreasing patients' pain and achieving improvements in chin contour and scarring.

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