

Supraclavicular flap reconstruction in head and neck surgery during the SARs-CoV-2 pandemic

M. Walsh^{1,2}, S.L. Gillanders^{1,2}, N. O’Keeffe^{1,2}, P. Lennon², J. Kinsella², C. Timon².

1. Royal College of Surgeons Ireland, 123 York Street, St. Stephen’s green, Dublin 2, Ireland.
2. Department of Otolaryngology, St. James’s Hospital, Dublin 8, Ireland.

Abstract

Aims

The exponential spread of Sars-CoV-2 throughout the world has significantly altered the approach to elective surgery. With limited availability to ICU, alternative reconstructive options must be considered for head and neck cancers. Our study retrospectively reviews five head and neck reconstructive cases which employed the supraclavicular flap as an alternative to free flap reconstruction

Methods

Retrospective review of five patients, who underwent ablative head and neck surgery requiring primary reconstruction during the initial surge of Sars-CoV-2 in Ireland (2020-2021). Clinical assessment with a Likert scale depicting outcome satisfaction was performed. Description of the surgical technique employed is outlined.

Results

All five of our patients undergoing supraclavicular pedicled flap reconstruction were male, with a mean age of 74, range (66-92). Four of the five patients were active smokers. Two cases were oral cavity primary cancers requiring a significant floor of mouth resection, two cutaneous skin cases and one salvage laryngectomy. Oral cavity tumours reconstructed with the pedicled supraclavicular flap reported good speech and swallow function with a score of 4 of 5 on a Likert scale for each. Similar results are seen with minimal level of impingement on movement of their shoulder, 4 out of 5 on Likert scale.

Discussion

Local pedicled flaps such as the supraclavicular flap offer a viable alternative to free flap repair resulting in good functional and aesthetic outcomes.

Introduction

The exponential spread of Sars-CoV-2 throughout the world has significantly altered the approach to elective surgery. Head and neck oncology surgery, has remained a priority for ENT specialists given the time sensitive nature of intervention and should not be delayed without significant reason ¹. With the World Health Organization (WHO) declaring a pandemic on the 11th of March 2020², 28 million surgeries were cancelled, with 37.7% of these cancer cases³. Published guidelines recommended surgical personnel, operative time and intensive care resources should all be minimised where possible⁴.

Ireland has seen three surges of Sars-CoV-2 over a three year period 2020-2023, affecting elective surgical admissions for head and neck cancer, most significantly in January 2021 with 218 Sars-CoV-2 patients admitted to the intensive care unit (ICU)⁵. With limited availability to ICU, alternative reconstructive options must be considered for head and neck cancers. There too is uncertainty around the efficacy of vaccines on evolving virus strains, leading to the possibility of further surges and restrictions of elective oncology surgery.

The supraclavicular flap also known as 'In Charretera' which is traditionally the name given to the strip of cloth that holds military honours on the shoulder⁶, is a versatile pedicled flap based on the transverse cervical artery.

Our study retrospectively reviews five head and neck reconstructive cases which employed the supraclavicular flap as an alternative to free flap reconstruction. Assessment of their functional, aesthetic and quality of life outcomes were assessed for employment in potential Sars-CoV-2 surges whereby ICU beds, staff and theatre space may not be readily available.

Methods

Retrospective review of five patients, who underwent ablative head and neck surgery requiring primary reconstruction during the initial surge of Sars-CoV-2 in Ireland (2020-2021). Telephone and clinic follow up at 1 year to assess functionality and aesthetic outcomes, utilising a Likert scale for satisfaction outcomes was utilised.

The flap is designed and marked out pre-operatively (Figure 1), maximal dimensions of 8cm in width and 25cm in length can be fashioned in a fusiform shape, to facilitate adequate closure⁷. A hand held Doppler can be used to identify the supraclavicular artery which is a branch of the transverse cervical artery. Dissection occurs from distal to proximal in the sub-fascial plane, once the dissection reaches the clavicle it changes to a sub periosteal approach into the supraclavicular fossa⁸. Once elevated the flap is turned and placed into

position ensuring it is tension free and unkinked (Figure 2). Harvesting time takes 20-30 minutes with primary closure and drain placement at the surgeon's discretion (Figure 3).

Results

All five of our patients undergoing supraclavicular pedicled flap reconstruction were male, with a mean age of 74, range (66-92). Four of the five patients were active smokers. Two cases were oral cavity primary cancers requiring a significant floor of mouth resection. One received a rim mandibulectomy, the other a segmental mandibulectomy both in conjunction with bilateral neck dissections and tracheostomy (Figure 4). There were two cutaneous skin cases that received a parotidectomy, selective neck dissection levels 1-4 and subtotal pinnectomy. The final case was a recurrent supraglottic laryngeal tumour staged as T4NOMO, previously treated with chemo-radiation in 2017. This patient received a salvage laryngectomy. All patient histology was squamous cell carcinoma.

Post-operative follow up assessment derived various clinical outcomes in terms of aesthetics and functionality given the differing locations of the primary lesion. Those with oral cavity tumours reconstructed with the pedicled supraclavicular flap reported good speech and swallow function with a score of 4 of 5 on a Likert scale for each. The cutaneous lesions focused primarily on range of movement of the neck and shoulder given the limited impact surgery would have on their speech and swallow. This again offered good insight with 4 out of the 5 reporting minimal impingement (Likert score 4/5) on their range of movement. Unfortunately assessment of our laryngeal patient was lost to follow up.



Figure 1: A large circumscribed left cutaneous squamous cell carcinoma partially eroding the left pinna and preauricular area is evident. The skin marking identifies the pivot point, length and width of the area over the donor supraclavicular site, which will replace the resulting defect.

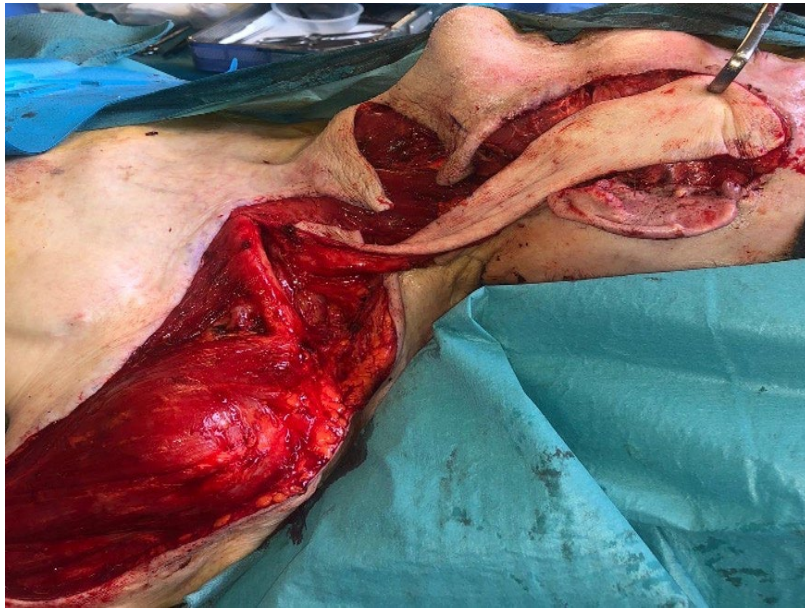


Figure 2: The dissection depicts the deltoid and trapezius muscles, with the exposed deeper lobe of the parotid. The flap is lifted and turned to fill the corresponding defect. Ensuring that the pedicle is not kinked on its axis compromising blood flow.



Figure 3: Skin closure is with staples. Bismuth gauze is placed to assure patency of the external auditory canal. This post-operative image portrays the excellent closure and minimal morbidity from the supraclavicular donor site.

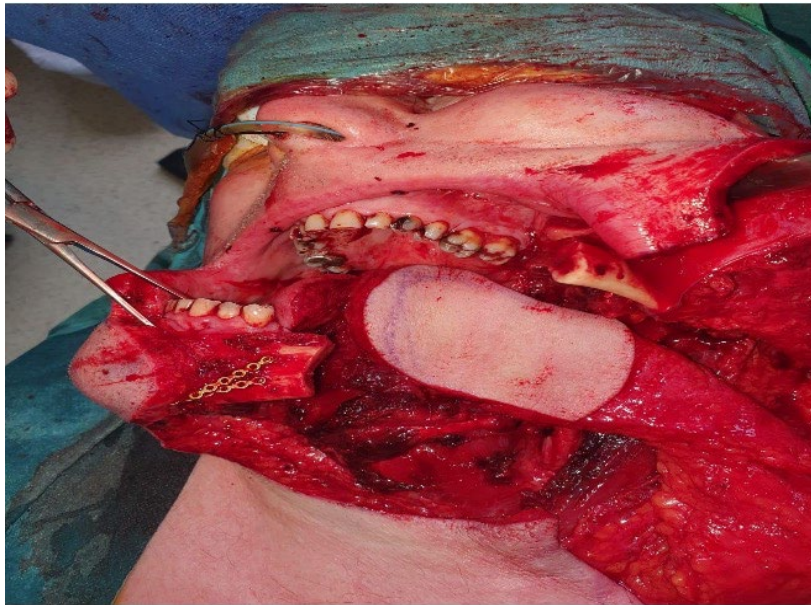


Figure 4: The Supraclavicular flap is lifted with the supraclavicular artery pedicle identified with the help of a Doppler. The defect in the floor of the mouth and segmental mandibulectomy is apparent. The supraclavicular flap is inset into the floor of mouth to give adequate support and closure, facilitating continued swallow and speech.

Discussion

Sars-CoV-2 has put unprecedented pressure on the Irish health system. There has been a severe curtailment of resources and capacity, where many cancer services have had to reduce or even cease their routine clinical activity⁹. Intensive care beds have been saturated with Sars-CoV-2 patients throughout the world¹⁰, placing significant strain on anaesthesiologists and nursing staff. Balancing critical oncological surgical intervention in the head and neck with that of limited resources given the pandemic has proved complex.

Recommendations from Mehanna et al state that it is not acceptable to delay advanced head and neck cancer cases beyond 4 weeks of diagnosis, if this was likely to be the case then chemotherapy and or radiotherapy treatment should commence immediately⁷.

Unfortunately, timely treatment has been delayed by a multitude of variable's including late presentation for fear of nosocomial contraction of Sars-CoV-2, reduced access to primary health providers, and delayed referral on to tertiary referral centres with limited outpatient facilities and diagnostic services. The effect of future surges in hospital and ICU admissions will no doubt affect the ability of head and neck surgeons to admit and treat in a timely manner.

Reconstruction recommendations state that free flap surgery should be avoided if possible at the peak of the Covid pandemic and that reconstruction of head and neck ablative surgery should employ the most efficient procedure to facilitate expedited discharge while minimising the risk of returning to theatre¹¹. Pedicled flap repair has historically proven invaluable in reconstitution of head and neck functionality. Studies have shown no statistical difference between pedicled and free tissue transfer for oropharyngeal reconstruction in cosmetic deformity, diet and socialisation¹¹. Mahieu et al looked at 93 patients with oral cancer between 2006 and 2015 in Florence, Italy. Sixty four were pedicled flap reconstructions (69%). The results showed no significant differences in terms of functional outcome, flap necrosis and complications. Complete tissue necrosis of the Supraclavicular flap was reported as 0% to 5.6%⁵. This is reassuring when counselling patients of their potential reconstruction options despite the system constraints faced in a pandemic.

When comparing the two reconstructive methods there is a marked difference in operative time, prolonged hospitalization and ICU requirement, favouring pedicled flap repair¹¹, this is of significant importance considering the limited theatre and ICU availability during Sars-CoV-2 surges. McCrory et al. described that operative time, resection-reconstruction, was statistically much longer for free flap than for pedicled flap procedures (9 hours 35 min vs 4 hours 58 min)¹². The time, equipment and manpower required for microvascular free flap repair during a pandemic with evolving variants and potential future surges may not be appropriate given the well documented benefits of local pedicled flap repair.

There are limitations to the study in that operative time was not recorded, there is significant variation in the pathology treated and functional and aesthetics outcomes are significantly different between cutaneous and laryngeal lesions. A small sample size has been presented and so conclusions on outcomes and complication rates cannot be made. However, these factors have been addressed in the larger studies mentioned above. Despite these limitations, this study offers an alternative surgical technique that may be helpful in times of future resource limitations and restrictions as seen in the recent Sars-CoV-2 surges.

Constraints posed by the pandemic have altered our reconstructive management of head and neck patients at our institution. Consideration to comorbidities, ICU access, and patient preferences all need to be determined prior to the ablative process. Our experience has

been that local pedicled flaps such as the supraclavicular flap offer a viable alternative to free flap repair resulting in good functional and aesthetic outcomes.

Declarations of Conflicts of Interest:

None declared.

Corresponding Author:

Michael Walsh,
Department of Otolaryngology,
St. James's Hospital,
Dublin 8,
Ireland.
E-Mail: michaelwalsh@rcsi.com

References:

1. Chaves ALF, Castro AF, Marta GN, Junior GC, Ferris RL, Giglio RE, Golusinski W, Gorphe P, Hosal S, Leemans CR, Magné N, Mehanna H, Mesía R, Netto E, Psyrrri A, Sacco AG, Shah J, Simon C, Vermorken JB, Kowalski LP. Emergency changes in international guidelines on treatment for head and neck cancer patients during the COVID-19 pandemic. *Oral Oncol.* 2020 Aug; 107:104734. doi: 10.1016/j.oraloncology.2020.104734. Epub 2020 Apr 24. PMID: 32353793; PMCID: PMC7180373
2. WHO Director-General's opening remarks at the media briefing on COVID-19-11 March 2020.
3. Thompson, Alexandra et al. "Potential Benefits from the Use of the Supraclavicular Artery Island Flap for Immediate Soft-Tissue Reconstruction during the COVID-19 Pandemic." *Journal of Maxillofacial & Oral Surgery* 19 (2020): 511 - 516.
4. Kim RJ, Izzard ME, Patel RS. Supraclavicular artery island flap for reconstructing defects in the head and neck region. *Curr Opin Otolaryngol Head Neck Surg.* 2011 Aug;19(4):248-50. doi: 10.1097/MOO.0b013e328347f811. PMID: 21593670.
5. Kokot N, Mazhar K, Reder LS, Peng GL, Sinha UK. The supraclavicular artery island flap in head and neck reconstruction: applications and limitations. *JAMA Otolaryngol Head Neck Surg.* 2013 Nov;139(11):1247-55. doi: 10.1001/jamaoto.2013.5057. PMID: 24158458.
6. Herr MW, Emerick KS, Deschler DG. The supraclavicular artery flap for head and neck reconstruction. *JAMA Facial Plast Surg.* 2014 Mar-Apr;16(2):127-32. doi: 10.1001/jamafacial.2013.2170. PMID: 24370537.

7. Mehanna H, Hardman JC, Shenson JA, Abou-Foul AK, Topf MC, AlFalasi M, Chan JYK, Chaturvedi P, Chow VLY, Dietz A, Fagan JJ, Godballe C, Golusiński W, Homma A, Hosal S, Iyer NG, Kerawala C, Koh YW, Konney A, Kowalski LP, Kraus D, Kuriakose MA, Kyrodimos E, Lai SY, Leemans CR, Lennon P, Licitra L, Lou PJ, Lyons B, Mirghani H, Nichols AC, Paleri V, Panizza BJ, Parente Arias P, Patel MR, Piazza C, Rischin D, Sanabria A, Takes RP, Thomson DJ, Uppaluri R, Wang Y, Yom SS, Zhu YM, Porceddu SV, de Almeida JR, Simon C, Holsinger FC. Recommendations for head and neck surgical oncology practice in a setting of acute severe resource constraint during the COVID-19 pandemic: an international consensus. *Lancet Oncol.* 2020 Jul;21(7):e350-e359. doi: 10.1016/S1470-2045(20)30334-X. Epub 2020 Jun 11. PMID: 32534633; PMCID: PMC7289563.
8. Rampinelli V, Mattavelli D, Gualtieri T, et al. Reshaping head and neck reconstruction policy during the COVID-19 pandemic peak: Experience in a front-line institution. *Auris Nasus Larynx.* 2020;47(3):489-491. doi:10.1016/j.anl.2020.04.008
9. F Martin, S Potter, B O'Sullivan, C Theopold, ST O'Sullivan, E Beausang, N McInerney, R Caulfield, R Hanson, J Martin-Smith, P Sullivan, N Ajmal, B Kneafsey. Guidelines for Microsurgery During the COVID-19 Pandemic, Irish Microsurgery Special Interest Group.
10. O'Neill JP, Shine N, Eadie PA, Beausang E, Timon C. Free tissue transfer versus pedicled flap reconstruction of head and neck malignancy defects. *Ir J Med Sci.* 2010 Sep;179(3):337-43. doi: 10.1007/s11845-010-0468-4. Epub 2010 Feb 12. PMID: 20151334.
11. Mahieu R, Colletti G, Bonomo P, et al. Head and neck reconstruction with pedicled flaps in the free flap era. Ricostruzioni del distretto testa collo con lembi pedunculati nell'era dei lembi liberi. *Acta Otorhinolaryngol Ital.* 2016;36(6):459-468. doi:10.14639/0392-100X-1153
12. McCrory AL, Magnuson JS. Free tissue transfer versus pedicled flap in head and neck reconstruction. *Laryngoscope.* 2002;112:161–165. [[PubMed](#)] [[Google Scholar](#)]