Section: Plastic Surgery

Original Research Article

SURGICAL APPROACH FOR VENOUS MALFORMATION IN THE HEAD AND NECK

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Received *: 30/03/2025*
Received in revised form *: 24/05/2025*
Accepted *: 12/06/2025*

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DOI: 10.70034/ijmedph.2025.3.47

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (3); 263-266

ABSTRACT

Background: Venous malformations (VMs) are the most common type of low-flow vascular malformation, often affecting the head and neck. These congenital lesions may not become symptomatic until later in life and can cause functional or cosmetic concerns. The aim is to determine the effectiveness of surgery for the treatment of venous malformations of the head and neck.

Materials and Methods: A retrospective/prospective analysis was conducted on patients diagnosed with venous malformations of the head and neck who underwent surgical intervention. Data collected included demographic information, lesion location and size, type of surgical approach, adjunct treatments (e.g., sclerotherapy), intraoperative findings, and post-operative outcomes. Imaging modalities such as MRI and Doppler ultrasound were used for diagnosis and surgical planning.

Results: Most lesions were localized in the cheek, lips, or tongue. Complete excision was achieved in a majority of cases with minimal functional compromise. Some patients required combined treatment with preoperative sclerotherapy. Complications included minor wound infections and temporary nerve weakness in a few cases. A significant improvement in cosmetic and functional outcomes was observed post-surgery.

Conclusion: Surgical excision remains a reliable and effective modality for treating symptomatic venous malformations in the head and neck. Multidisciplinary planning, proper imaging, and case selection are essential to optimize outcomes and minimize complications.

Keywords: Venous malformation, head and neck, vascular anomaly, surgical management, low-flow malformation.

INTRODUCTION

Venous malformations (VMs) are congenital vascular anomalies resulting from errors in embryonic development of the venous system. They are classified under low-flow vascular malformations and are typically present at birth, although they may become more apparent with age, trauma, or hormonal changes. Among various anatomical regions, the head and neck account for a significant proportion of VMs due to the complex vascular anatomy and aesthetic sensitivity of this area.

Venous malformations (VMs) are the most common type of low-flow vascular malformation, accounting for approximately 40%–60% of all vascular malformations. Their overall incidence in the general population is estimated to be around 1–4 per 10,000 individuals. They occur equally in males and females and are present at birth, although they may not become clinically evident until later in childhood or adulthood.[1,2] Clinically, VMs in the head and neck can vary from small, asymptomatic lesions to extensive disfiguring masses. They may present with facial swelling, bluish discoloration, pain, bleeding, or functional impairments involving speech, swallowing, or breathing depending on the site and extent of involvement. Due to their slow-flow nature and non-regressive behavior, they often pose a therapeutic challenge. While various treatment modalities exist—including sclerotherapy, laser therapy, and conservative management—surgical excision remains a cornerstone for localized, well-circumscribed lesions or when other modalities are

insufficient. However, surgical intervention in this region demands a meticulous approach given the proximity to critical neurovascular structures and the need to preserve function and cosmesis.[3,4]

This article aims to review the indications, techniques, and challenges associated with the surgical management of venous malformations in the head and neck, highlighting both clinical decision-making and operative strategies for optimal patient outcomes.

MATERIALS AND METHODS

This was a prospective observational study conducted in the Department of plastic surgery at Osmania Medical college, over a period of February 2021 to May 2024. The study was approved by the Institutional Ethics Committee, and informed consent was obtained from all patients.

Study Population: A total of 36 patients with clinically and radiologically confirmed venous malformations (VMs) of the head and neck were included.

Inclusion Criteria

- Patients aged >1 year with symptomatic or cosmetically significant VMs.
- Lesions localized to the head and neck region.
- Patients fit for surgery under general anesthesia.

Exclusion Criteria

- Mixed-type vascular malformations.
- Previous surgery or sclerotherapy for the lesion.
- Lesions involving major intracranial extension or deep orbital involvement.

Preoperative Evaluation

All patients underwent a thorough clinical examination followed by imaging studies. Diagnostic workup included:

Ultrasound with Doppler to assess flow characteristics.

MRI with contrast to evaluate the lesion extent, involvement of surrounding tissues, and vascular anatomy.

CT scan was performed in selected cases with bony involvement or airway compression.

Surgical Procedure

The surgical approach was determined based on lesion size, location, depth, and relation to vital structures. Procedures were performed under general anesthesia using standard aseptic techniques. The surgical technique included:

- Preoperative marking with assistance from imaging.
- Blunt and sharp dissection to isolate the lesion while preserving adjacent nerves and vessels.
- Use of bipolar cautery or harmonic scalpel to minimize bleeding.
- En bloc excision was attempted where feasible; otherwise, piecemeal excision was done for extensive or infiltrative lesions.

Intraoperative challenges, estimated blood loss, duration of surgery, and intraoperative complications were recorded.

Postoperative Management

Patients were monitored for pain, swelling, hematoma, infection, and nerve function deficits. Follow-up was done at 1 week, 1 month, 3 months, and 6 months post-surgery to evaluate:

- Wound healing
- Functional recovery
- Aesthetic outcome
- Recurrence (clinical or radiologic)

Data Collection and Analysis

All data were recorded in a structured proforma and analyzed using SPSS v25.0. Descriptive statistics were used to summarize patient demographics, clinical presentation, and surgical outcomes. Quantitative variables were expressed as mean ± SD; qualitative variables were expressed as percentages. A P-value <0.05 was considered statistically significant.

RESULTS

A total of 36 patients with head and neck venous malformations underwent surgical treatment.

Table 1: Age and Gender Distribution (n = 36).

Age Group	Number of Patients	Percentage (%)
0–10 years	6	16.7%
11–20 years	10	27.8%
21–30 years	8	22.2%
31–40 years	7	19.4%
>40 years	5	13.9%
Total	36	100%
Gender	**Number of Patients**	**Percentage (%)**
Male	16	44.4%
Female	20	55.6%

The mean age of the patients was 23.4 ± 10.2 years (range: 4–48 years). The cohort included 20 females (55.6%) and 16 males (44.4%).

Table 2: Anatomic Distribution of Lesions (n = 36).

Site of Lesion	Number of Patients	Percentage (%)
Cheek/Buccal mucosa	11	30.6%
Lip	8	22.2%

Tongue	6	16.7%
Neck	4	11.1%
Periorbital region	3	8.3%
Floor of mouth	2	5.6%
Palate/Oral cavity	2	5.6%

The most common site of venous malformation was the cheek and buccal mucosa (30.6%), followed by the lip (22.2%), tongue (16.7%), and neck (11.1%).

Table 3: Surgical Parameters

Parameter	Value/Observation
En bloc excision	27 patients (75%)
Piecemeal excision	9 patients (25%)
Mean operative time	87 ± 18 minutes
Mean blood loss	70 ± 25 ml
Intraoperative complications	None reported

En bloc excision was performed in 27 cases (75%). Piecemeal excision was necessary in 9 cases (25%) due to diffuse or infiltrative extension. The mean operative time was 87 ± 18 minutes. Average intraoperative blood loss was 70 ± 25 ml, with no patients requiring transfusion. No major intraoperative complications were reported.

Table 4: Postoperative Outcomes (n = 36)

Outcome	Number of Patients	Percentage (%)
Uneventful recovery	31	86.1%
Minor complications	5	13.9%
Recurrence at 6 months	2	5.6%
Functional/aesthetic satisfaction	33	91.7%

Minor complications such as mild hematoma and transient facial swelling occurred in 5 patients (13.9%) and were managed conservatively. No cases of facial nerve injury, infection, or wound dehiscence. All patients were followed up for 6 months. Recurrence was clinically suspected in 2 cases (5.6%), confirmed by imaging.

DISCUSSION

Venous malformations (VMs) of the head and neck are challenging entities due to their variable presentation, anatomical complexity, and risk of recurrence. Our study of 36 patients provides insight into the demographics, surgical outcomes, and recurrence patterns of these lesions, with comparisons to published literature.

Demographics: In our series, the mean age at presentation was 23.4 ± 10.2 years, with a majority of cases (44.5%) occurring in the second and third decades of life. This aligns with previous literature, where venous malformations are often clinically evident in childhood or adolescence, though diagnosis may be delayed.[5,6] We observed a female predominance (55.6%), similar to findings by Enjolras et al. who reported a higher incidence in females in facial venous malformations.[7] Other studies have shown similar or slightly higher female ratios, possibly due to earlier cosmetic concern or hormone-related growth triggers.[8]

Lesion Site Distribution

The most common sites in our study were the cheek/buccal mucosa (30.6%), lip (22.2%), and tongue (16.7%). This anatomical distribution is comparable to previous reports by Lee et al. and Hassanein et al., who found that up to 40–60% of VMs occur in the head and neck, particularly the oral cavity and midfacial regions [9,10]. The lip and cheek region is often affected due to the rich venous plexus and embryologic fusion planes in the region.

Surgical Approach: En bloc excision was feasible in 75% of our cases, with piecemeal excision performed in 25% due to ill-defined margins or infiltrative extension. The average operative time (87 ± 18 minutes) and minimal blood loss (70 ± 25 ml) reflect the importance of preoperative imaging and careful surgical planning. Our en bloc success rate is consistent with the 70–80% rates reported by Koshy et al. and Burrows et al., who emphasize that complete excision is possible for well-localized lesions, while more diffuse forms require staged or adjunctive therapy.[11,12] Notably, none of our patients required intraoperative transfusion, highlighting the effectiveness of intraoperative hemostatic tools such as bipolar cautery and harmonic scalpel.

Postoperative Outcomes: Complication rates were low in our series (13.9%), and all were minor (hematoma, edema). No major neurovascular injuries or infections were observed. These outcomes compare favorably with complication rates of 10–20% reported in the literature.[13]

The recurrence rate of 5.6% (2 patients) at 6 months is within the reported recurrence range of 5–15%, particularly for lesions that required piecemeal excision or were close to critical structures.[14,15] Functionally and cosmetically satisfactory results were achieved in 91.7% of patients in our study, comparable to the 85–95% reported by Miller et al.[16]

CONCLUSION

The results of this study confirm that surgical excision remains a safe and effective option for well-defined venous malformations in the head and neck.

Careful patient selection, imaging, and surgical planning minimize complications and recurrence. Our outcomes are comparable to existing literature, reinforcing the role of surgery in the multidisciplinary management of VMs.

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