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Retrospective data analysis of referral letters for orofacial vascular anomalies to a tertiary center

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Original Article

Background: Vascular anomalies are disorders of the vascular system. These anomalies are classified as either vascular tumors or vascular malformations, with each possessing distinct characteristics. This study was performed to analyze vascular anomaly referrals to a tertiary center, identify patterns of misdiagnosis, and create a proforma to ensure the comprehensiveness of clinical information.

Methods: We retrospectively analyzed vascular anomaly referral letters received by Hospital Tunku Azizah from 2018 to 2023. Specifically, we descriptively analyzed the inclusion of vascular anomaly characteristics, the demographic profiles of referrers and patients, and basic clinical findings. Subsequently, we developed a redesigned proforma.

Results: Overall, 47 referral letters were analyzed. The patients comprised 25 boys and 22 girls, with ages ranging from birth to 14 years. Patient name, sex, and date of birth, along with the referrer's name and address, were satisfactorily documented. The review revealed that 44 (93.6%) of the letters included the patient's presenting problem, 43 (91.5%) contained clinical findings, 37 (78.7%) reported diagnostic investigations, and 29 (61%) referenced medical history. Regarding characteristics of vascular conditions, over half of the letters detailed time of appearance (n=40, 85%), growth (n=24, 66%), complications (n=25, 53.2%), color (n=32, 68%), and shape (n=34, 72%). However, fewer than half mentioned compressibility (n=7, 14.8%), pulsation (n=7, 14.7%), and associated conditions (n=2, 4.3%), and none referenced involution.

Conclusion: Although demographic data were generally well-documented, critical medical history information was frequently omitted, including a lack of adequate pre-referral investigations. Key characteristics of vascular anomalies, namely compressibility, pulsation, associated conditions, and involution, were frequently overlooked. Accurate documentation of these features is crucial for determining treatment urgency. A standardized proforma must be implemented to ensure that vital information is captured, thus facilitating diagnosis and optimizing patient care.

Abbreviations: AVM, arteriovenous malformation; MRI, magnetic resonance imaging; PG, pyogenic granuloma

Keywords: Referral and consultation / Vascular malformations / Vascular neoplasms

INTRODUCTION

In 1992, the International Society for the Study of Vascular Anomalies introduced a standardized nomenclature and diagnostic framework for vascular anomalies, building on the pioneering work of Mulliken and Glowacki [1], which focused on endothelial characteristics in children. This classification system was updated in 2018 [1,2]. Mulliken and Glowacki [1] categorized vascular anomalies into two primary groups: vascular tumors and vascular malformations. These categories are distinguished by significant differences in their underlying histology, clinical presentation, and biological behavior.

Histologically, the primary distinction between these two groups is cellular activity: vascular tumors are characterized by

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mitosis and increased endothelial cell turnover. In contrast, vascular malformations are marked by abnormalities in vascular morphogenesis without enhanced cellular turnover [3]. Apart from congenital hemangiomas, vascular tumors are not clinically apparent at birth [4]. They typically undergo a period of rapid growth followed by spontaneous involution, with the exception of non-involuting congenital hemangiomas. In contrast, vascular malformations are present from birth, although they may not be immediately visible and tend to grow in proportion with the individual.

Genetic mutations are pivotal in the pathogenesis of vascular anomalies, with the majority being somatic mutations and a smaller subset involving germline alterations. These genetic changes primarily activate two key intracellular signaling pathways: the PI3K/AKT/mTOR and the RAS/MAPK/ERK pathways [5]. A deeper understanding of these molecular mechanisms not only improves diagnostic precision in complex cases but also informs the development of targeted therapies.

Vascular tumors are categorized as benign, locally aggressive, borderline, or malignant. Hemangiomas represent the most common type of vascular tumor. Among benign vascular tumors, infantile hemangiomas account for about 90% of cases, while congenital hemangiomas constitute less than 2%. Notably, hemangiomas predominantly occur in the head and neck region (70%), followed by the chest and trunk (25%) and the upper and lower extremities (5%) [6].

Vascular malformations represent a diverse group of entities that differ from vascular tumors. These malformations include simple, combined, major named vessel malformations and syndrome-associated malformations. They are classified according to the type of malformed vessels involved, such as capillary, lymphatic, venous, arteriovenous, and various combinations of these. Jackson et al. [7] further classified vascular malformations into "high-flow" and "slow-flow" types depending on the presence or absence of arterial components, which is conceptually useful for diagnosis and treatment [7,8]. Venous malformations are the most common, accounting for about 70% of cases, followed by lymphatic malformations (12%), arteriovenous malformations (AVMs) (8%), combined malformation syndromes (6%), and capillary malformations (4%) [6].

Referral letters must clearly differentiate between vascular tumors and vascular malformations. This distinction is essential for the efficient transfer of information among oral healthcare professionals and facilitates seamless communication. Referral letters should contain the necessary details to assess clinical urgency and enable administrative staff to schedule appointments optimally. Furthermore, incorporating imaging tests and details of previous treatments increases the thoroughness of the referral and facilitates diagnosis, supporting further multidisciplinary case discussions that may be required [9].

Several publications offer recommendations for general dental referrals, and many hospitals have their own internal protocols [10-13]. The National Institute for Health and Care Excellence has published updated guidelines emphasizing the importance of well-structured referral letters, including for oral cancer [14]. Metcalfe et al. [15] observed a significant increase in referral rates following the implementation of these guidelines, underscoring the critical need for clear and detailed communication. Furthermore, previous research consistently shows that the adoption of standardized proformas improves both the quantity and quality of the information provided in dental referrals [13,16]. However, despite these advancements, no guidelines have yet been established to specify the key content required for vascular anomaly referrals. This lack of standardization can lead to the omission of crucial details by referrers, potentially impacting the quality of patient care.

Hence, our study aims to evaluate the comprehensiveness of orofacial vascular anomaly referrals, elucidate patterns of misdiagnosis, and develop a standardized referral proforma for our center. Utilizing the developed proforma, oral healthcare professionals can achieve the highest standards in their referrals. This will expedite the identification of vascular anomalies, help assess clinical urgency and facilitate the planning of any necessary involvement by multidisciplinary teams.

METHODS

This single-center retrospective study analyzed referral letters for orofacial vascular anomalies at a tertiary center over a 5-year period from January 2018 to December 2023. We included patients aged 16 years and younger who were diagnosed with a vascular anomaly in the orofacial region. The study comprehensively examined the presence of vascular anomaly characteristics in referral letters, the demographic profiles of both referrers and patients, and basic clinical findings. Due to the absence of universally established standards for oral vascular referral letters, we adapted an evidence-based standard for dental referrals as a reference point, incorporating elements from several publications [10-13]. Based on the characteristics of vascular anomalies, key features to note include the time of appearance, color, shape, growth pattern, presence of involution, compressibility, pulsation or thrill, and any associated conditions or complications [17,18]. After the collection of all data, which included basic referral details, clinical section details, and special characteristics of vascular anomalies, the data were descriptively analyzed using SPSS version 27 (IBM Corp.). Descriptive

data are presented as percentages unless stated otherwise.

The study was granted ethical approval by the Medical Research and Ethics Committee of the Ministry of Health (RSCH ID-23-06289-WFQ). It adhered to the ethical principles set forth in the Declaration of Helsinki and conformed to the Malaysian Good Clinical Practice Guidelines. All data from referral letters were stored in a password-protected database and were associated exclusively with a study ID number.

RESULTS

The demographic data from 47 referral letters for vascular anomalies are presented in Table 1. The patients included 25 boys and 22 girls, with a mean age of 5.7 ± 4.5 years. Most of the patients were Malay (n = 38), with smaller numbers of Chinese (n = 5), Indian (n = 2), Bajau (n = 1), and Dusun (n = 1) patients. Vascular malformations were more commonly diagnosed than vascular tumors. Within the orofacial region, the tongue was the most frequently affected site (n = 13), followed by the cheek and lip (n = 10), while the hard palate was the least involved (n = 2). As noted in the referral letters, magnetic resonance imaging (MRI) was the most common diagnostic imaging tool (n = 28). Accurate localization of the lesion and its extent, as determined by MRI, is crucial for directing appropriate specialist referrals. For instance, lesions extending to the throat may require evaluation by an otolaryngologist, while those affecting the skin could necessitate referral to a dermatologist.

Table 2 highlights deficiencies in the referral information provided. Notably, 44 referrals (93.6%) included the patient's age, which is particularly important given that our department serves patients under the age of 16 years. However, the patient's address was absent from all referrals. More than half of the referrers (n = 24, 51.1%) did not provide their phone number. Regarding clinical details, 44 referrals (93.6%) described the presenting problem, and 41 (87.2%) detailed the problem's nature and history. Investigations were mentioned in 37 referrals (78.7%), with MRI results being the most frequently reported. The diagnosis was noted in 45 cases (95.7%), but only four letters (8.5%) indicated the urgency of the referral. Additionally, only 29 referrals (61.7%) included a detailed medical history, 16 (34%) listed current medications, and 18 (38.3%) mentioned allergies.

Table 3 highlights deficiencies in the documentation of key characteristics of vascular anomalies in referral letters. Although 40 (85.1%) of the letters recorded the time of appearance, 32 (68.1%) mentioned the color, 34 (72.3%) noted the

Table 1. Demographic data (n=47)

Characteristic	No. (%)
Sex (male:female)	25:22
Age (yr), mean ± SD	5.7 ± 4.5
Ethnicity	
Malay	38 (80.8)
Chinese	5 (10.6)
India	2 (4.3)
Others	2 (4.3)
Referring diagnosis	
Vascular tumor	21 (44.7)
Vascular malformation	24 (51.1)
No diagnosis	1 (2.1)
Others	1 (2.1)
Site	
Cheek	10 (21.3)
Lip	10 (21.3)
Tongue	13 (27.7)
Hard palate	2 (4.3)
Labial/buccal mucosa	7 (1.5)
Others (gingiva, floor of mouth)	5 (1.1)
Assessment(s)	
MRI	28 (59.6)
Ultrasound	3 (6.4)
CT	2 (4.3)
MRI and CT	2 (4.3)
Biopsy	2 (4.3)
None	10 (21.3)

SD, standard deviation; MRI, magnetic resonance imaging; CT, computed tomography.

Table 2. Frequencies of data points provided (n=47)

Criteria	No. (%)
Basic referral	
Patient full name	47 (100)
Patient date of birth	47 (100)
Patient age	44 (93.6)
Patient address	0
Referrer name	47 (100)
Referrer address	47 (100)
Referrer phone number	23 (48.9)
Clinical section details	
Presenting problem	44 (93.6)
Nature and history of problem	41 (87.2)
Clinical finding	43 (91.5)
Investigation	37 (78.7)
Diagnosis	45 (95.7)
Urgency of referral	4 (8.5)
Past medical history	29 (61.7)
Past or current medication	16 (34.0)
Medical alert	18 (28.3)

shape, and 24 (51.1%) documented growth, none included information on involution. Additionally, 40 (85.2%) of the referrals omitted details on compressibility and the presence of pulsation, and 45 (95.7%) failed to mention associated conditions. However, 25 (53.5%) of the referrals did note complications such as bleeding and ulceration. A thorough evaluation of clinical manifestations, lesion progression, and unusual clinical behaviors is crucial for differentiating malignant soft tissue tumors from benign vascular anomalies. For instance, vascular lesions that present as firm and hard masses, which is atypical for most vascular anomalies, may indicate malignancy [19].

In evaluating the accuracy of the referrer's diagnosis of vascular anomalies (Table 4), hemangiomas were commonly mistaken for venous malformations, representing 55.5% of such misdiagnoses. In turn, 100% of venolymphatic malformations were misdiagnosed as hemangiomas. Additionally, the obsolete term "lymphangioma" continued to be improperly used for lymphatic malformations. Regarding vascular tumors, all cases of pyogenic granuloma (PG) were incorrectly diagnosed as AVMs.

Regarding the ultimate diagnosis (Table 5), hemangiomas were the most frequently diagnosed vascular tumors (n = 5, 71.4%), while venous malformations were the most frequently diagnosed vascular malformations (n = 25, 62.5%). Girls (n = 4) were more often diagnosed with vascular tumors than boys (n = 3), displaying a ratio of 1.3:1. Conversely, boys (n = 22) were more frequently diagnosed with vascular malformations than girls (n = 18), with a ratio of 1:0.81. The age at which lesions became apparent or onset occurred was similar for vascular tumors (0–132 months) and vascular malformations (0–144 months). However, vascular malformations tended to present slightly later in the tertiary center (0–178 months) compared to vascular tumors (0–138 months).

Table 3. Distinctive characteristics of vascular anomalies (n=47)

Characteristic	No. (%)
Time of appearance	40 (85.1)
Color	32 (68.1)
Shape	34 (72.3)
Growth	24 (51.1)
Involution	0
Compressibility	7 (14.9)
Pulsation/thrill	7 (14.9)
Associated conditions	2 (4.3)
Associated complications	25 (53.2)

DISCUSSION

Vascular anomalies in the head and neck region account for approximately 60% of such diagnoses in pediatric patients, affecting about one in 22 children [17]. Our study was centered on vascular anomalies in the orofacial region. Most cases involved Malay patients, which reflects the ethnic makeup of Malaysia. More boys were diagnosed than girls, with a ratio of 1:0.88. This represents a deviation from the findings of a study by Ng et al. [20] in the same geographical region, which reported a ratio of 1:2.1. The difference may stem from our study's exclusive focus on the orofacial region. However, we observed a woman's predominance regarding vascular tumors, aligning

Table 4. Comparison of final diagnoses for vascular anomalies with common referral misdiagnoses

Vascular anomaly	Final diagnosis	No. of common referral misdiagnosis
Vascular tumor	Pyogenic granuloma	2 Arteriovenous malformations
Vascular malformation	Venous malformation	10 Hemangiomas
		3 Arteriovenous malformations
		2 Venolymphatic malformations
		1 Lymphatic malformation
		1 Lymphangioma
		1 Angiolipoma
	Venolymphatic malformation	4 Hemangiomas
	Lymphatic malformation	4 Lymphangiomas

Table 5. Final diagnosis

Final diagnosis	Vascular tumor (n = 7)	Vascular malformation (n = 40)
Type	5 Hemangiomas (71.4%)	1 Capillary malformation (2.5%)
	2 Pyogenic granulomas (28.6%)	1 Capillary venous malformation (2.5%)
		5 Lymphatic malformations (12.5%)
		8 Venolymphatic malformations (20.0%)
		25 Venous malformations (62.5%)
Sex (male:female)	3:4	22:18
Age range of lesion onset (mo)	0–132	0–144
Age range at presentation to the clinic (mo)	0–138	0–178

with other studies that have reported ratios as high as 5:1 [21]. Our study also recorded a lower number of vascular tumors compared to vascular malformations, with a ratio of 1:6. This supports the research of Greene et al. [22], who found that vascular malformations were about twice as common as vascular tumors.

In our study, vascular tumors were generally diagnosed earlier than vascular malformations. Although vascular malformations are present at birth, they can remain undiagnosed until the second decade of life. This delay in diagnosis may result from their initial invisibility due to their location. These lesions become noticeable only as they enlarge over time or when they begin to cause symptoms such as pain, functional impairments, bleeding, speech disturbances, or respiratory obstruction [17]. These conditions are often exacerbated by infection, trauma, or hormonal changes (such as those occurring during pregnancy or puberty), particularly in cases of slow-flow vascular malformation [23]. Regarding location, our study found that the tongue was the most frequently affected site in the orofacial region, especially in cases of venous malformation. This finding aligns with other research indicating that the tongue is impacted in approximately 63% of cases [24].

Referrals accompanied by imaging are especially useful, as they provide detailed imaging data that can substantially increase diagnostic accuracy, with research indicating up to 90% accuracy in certain cases [25]. Ultrasound is often chosen as the first imaging modality due to its non-invasive nature, cost-effectiveness, and real-time evaluation capabilities. Specifically, color Doppler ultrasound helps physicians differentiate between high-flow and low-flow vascular malformations, as well as between lymphatic and venous malformations. On ultrasound, vascular malformations typically present as small, chamber-like structures, while phleboliths appear as echogenic foci with acoustic shadowing—features characteristic of venous malformations [25].

However, in our study, MRI was the most frequently used imaging technique, with ultrasound imaging described in only three instances. This preference may be due to the absence of transducers tailored for intraoral use. The anatomical confines of the oral cavity impose spatial restrictions that can impede the proper handling of the transducer, thereby limiting its diagnostic capabilities [26]. In the context of vascular anomalies, MRI is considered the optimal imaging modality because of its superior capacity to assess the extent and structural involvement of these anomalies [27].

Regarding patient details, none of the referral letters provided the patient's address, which is essential for scheduling visit dates, given that our center receives cases from across Malaysia. Additionally, the patient's age must be specified to arrange for chaperoning and childcare, as well as to ensure appropriate referral to our center, which serves patients aged 16 years and under. Nevertheless, the patient details were generally satisfactory, including name and date of birth. The referring practitioner's name and address were almost always included. However, around half of the referrers failed to provide their telephone number, which complicates the process of contacting the clinic or hospital for further inquiries.

Crucially, all referral letters should include the presenting problem. For vascular anomalies, this information can aid in the general classification of conditions as either tumors or malformations [17]. Despite the importance of this detail, it was only provided in 44 (93.6%) of cases. More concerning was the notable lack of documentation regarding clinical findings. An accurate early clinical assessment is essential because it determines the urgency and need for a multidisciplinary team approach in the management of vascular anomalies. Additionally, the letters often omitted information about past medical history, current medications, and allergies. Medical history can reflect associated medical conditions, such as seizures and developmental delays in Sturge-Weber syndrome or thrombocytopenia in Kasabach-Merritt syndrome [4]. This omission could result from referrers focusing on the lesion while missing underlying issues, as well as a lack of awareness of associated medical conditions. Alternatively, the absence of this information could be due to the patients being seen very early in life, such as immediately after birth, when such details have not yet been thoroughly documented.

Distinctive clinical information pertaining to vascular anomalies was frequently omitted. For instance, the time of onset, a key detail that aids in distinguishing between tumors and malformations, was not documented in approximately 15% of cases. Additionally, the extent to which the lesion progressed with the patient's growth—a hallmark of vascular malformations—was only noted in 24 (51%) of the referral letters. This lack of information is noteworthy because vascular malformations typically progress with age or in response to various factors, such as infection, trauma, or hormonal shifts (for instance, during pregnancy or puberty). These factors are important to consider, as they can influence the clinical presentation of vascular tumors as well.

Furthermore, the pattern of involution was not documented in any referral letters. This pattern is characteristic of common infantile hemangiomas in children, which exhibit a triphasic growth cycle. These hemangiomas affect 4% to 10% of infants, with 60% of cases presenting in the head and neck region [28]. Typically, the lesions experience rapid proliferation during the

first several months, continuing up to around 12 months of age, after which they reach a plateau. Following this, the lesions involute, generally by the third to fifth year, and may resolve completely or leave a small, non-neoplastic fibrous scar [29]. The lack of recorded involution may be attributed to the fact that the lesions were referred during their active growth phase before involution had commenced.

Regarding other crucial clinical information, the color (which can indicate the depth of the lesion) was missing in 30% of cases. Superficial infantile hemangiomas typically present as erythematous plaques or papules. In contrast, deeper infantile hemangiomas appear as nodules with a pale or dusky blue coloration [30]. Venous malformations exhibit a distinct color pattern: superficial lesions are often maroon or purple, while deeper lesions have a bluish hue. In some instances, deeper lesions may not be visible at all, presenting instead as pain and/or swelling [31,32].

Only seven (14.8%) of the letters documented lesion compressibility, a typical clinical feature often associated with venous malformations [6]. These malformations exhibit compressibility since they can be emptied upon compression as blood is expelled from the lesion. Venous malformations feel soft to the touch and become lighter in color when compressed. In contrast, lymphatic malformations do not exhibit compressibility [30]. Additionally, only seven (14.8%) of the referral letters noted the presence of pulsation or bruit on auscultation, an important clinical indicator of high-flow lesions such as AVMs [33]. Greene's study identified infantile hemangioma and PG as the most frequently recognized vascular tumors with the lowest diagnostic error rates [22]. However, our study indicated that PG was often misdiagnosed as AVM, a distinction that could have been clarified by noting clinical signs characteristic of AVM, such as pulsation or thrill.

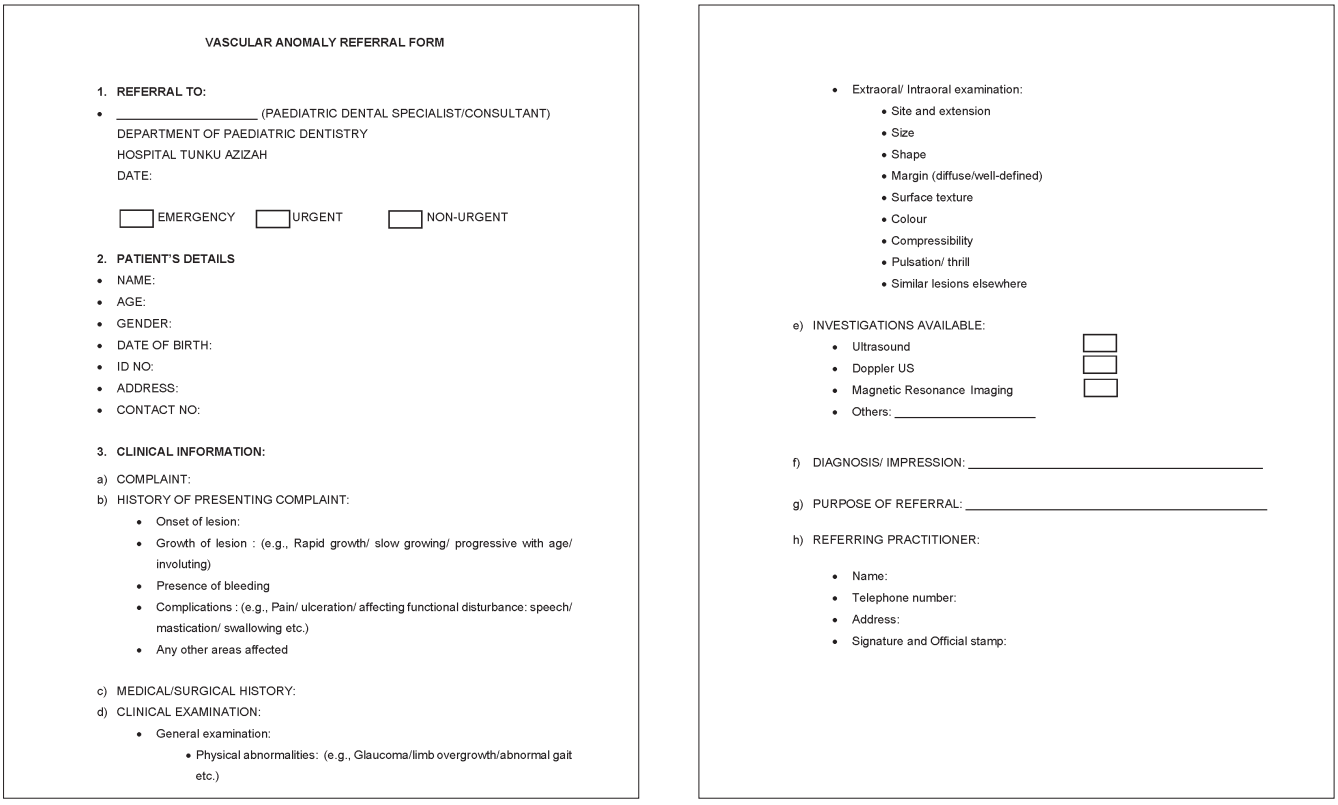
Local complications can include bleeding, damage to anatomical structures, infection, obstruction, pain, thrombosis, and ulceration. In contrast, systemic complications may encompass congestive heart failure, disseminated intravascular coagulation, pulmonary embolism, thrombocytopenia, and sepsis [18]. Approximately half of the letters noted bleeding as a complication. None of them indicated an association with any other related conditions, as all cases were non-syndromic. Certain vascular anomalies are known to be associated with specific syndromic conditions. For instance, the presence of five or more cutaneous hemangiomas may warrant an abdominal ultrasound to check for associated hepatic hemangiomatosis [34]. Similarly, hemangiomas in the cervicofacial region can be linked to PHACES syndrome, which is characterized by eye abnormalities. Limb overgrowth is often observed in patients with Klippel-Trenaunay syndrome, while glaucoma is a frequent complication in those with Sturge-Weber syndrome [35,36].

Our study revealed that 14 venous malformations and venolymphatic malformations (approximately 30% of total cases) were misdiagnosed as hemangiomas. This observation is consistent with the findings of Greene et al. [22], who identified a challenge in differentiating between vascular malformations and vascular tumors. They reported misdiagnosis rates of 29.6% for vascular tumors and 54.4% for vascular malformations in referral letters. Levin et al. [2] corroborated these findings, noting that only 42% of cases were accurately diagnosed at the time of referral. Regarding vascular tumors, our study found that four cases (8%) were described using outdated terms such as "mass" or "lymphangioma," highlighting the continued use of inappropriate terminology and inaccurate classification. This practice could potentially lead to misguided treatment planning.

This study had several limitations that could impact the validity and generalisability of the findings. The small sample size is one example, as it may not fully represent the broader population of patients with vascular anomalies, thus potentially limiting the applicability of the results to other settings. Additionally, the quality of data was compromised by poor handwriting in some records, which may have led to the omission or misinterpretation of crucial information. This issue underscores the importance of clear and accurate documentation in clinical settings. Furthermore, potential biases must be considered. Selection bias may have occurred if the sample was not representative of the general population of patients with vascular anomalies. Observer bias could also have affected the assessment and interpretation of clinical data, especially if the individuals reviewing the records held pre-existing expectations or assumptions.

Despite these limitations, the findings from this study have been used to create an educational tool designed to improve referral practices. The custom-designed proforma developed through our research (Fig. 1) is recommended for adoption by referring practitioners to standardize and improve the quality of referral information. This proforma addresses several of the limitations identified and aims to reduce the risk of omitting or misinterpreting information in future referrals.

The high prevalence of vascular anomalies in the head and neck region underscores the urgent need for improved diagnostic accuracy, targeted referral protocols, and specialized care. To meet these needs, the referral proforma should be systematically integrated into the referral process across healthcare settings, accompanied by training of practitioners and regular



VASCULAR ANOMALY REFERRAL FORM

1. REFERRAL TO:
- _____ (PAEDIATRIC DENTAL SPECIALIST/CONSULTANT)
DEPARTMENT OF PAEDIATRIC DENTISTRY
HOSPITAL TUNKU AZIZAH
DATE:

☐ EMERGENCY ☐ URGENT ☐ NON-URGENT

2. PATIENT'S DETAILS
- NAME:
- AGE:
- GENDER:
- DATE OF BIRTH:
- ID NO:
- ADDRESS:
- CONTACT NO:

3. CLINICAL INFORMATION:

a) COMPLAINT:
b) HISTORY OF PRESENTING COMPLAINT:
- Onset of lesion:
- Growth of lesion : (e.g., Rapid growth/ slow growing/ progressive with age/ involuting)
- Presence of bleeding
- Complications : (e.g., Pain/ ulceration/ affecting functional disturbance: speech/ mastication/ swallowing etc.)
- Any other areas affected

c) MEDICAL/SURGICAL HISTORY:
d) CLINICAL EXAMINATION:
- General examination:
  - Physical abnormalities: (e.g., Glaucoma/limb overgrowth/abnormal gait etc.)
- Extraoral/ Intraoral examination:
  - Site and extension
  - Size
  - Shape
  - Margin (diffuse/well-defined)
  - Surface texture
  - Colour
  - Compressibility
  - Pulsation/ thrill
  - Similar lesions elsewhere

e) INVESTIGATIONS AVAILABLE:
- Ultrasound ☐
- Doppler US ☐
- Magnetic Resonance Imaging ☐
- Others: _____

f) DIAGNOSIS/ IMPRESSION: _____

g) PURPOSE OF REFERRAL: _____

h) REFERRING PRACTITIONER:
- Name:
- Telephone number:
- Address:
- Signature and Official stamp:

Fig. 1. Referral proforma.

audits to ensure its effective use.

This approach is anticipated to meaningfully improve the quality of referral letters, minimize the occurrence of missing information, and facilitate more accurate and timely diagnoses. Ultimately, it aims to optimize patient management and treatment outcomes by ensuring consistent and comprehensive communication.

NOTES

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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Ethical approval

Ethical approval for the study was granted by the Medical Research and Ethics Committee of the Ministry of Health Malaysia (NMRR ID-23-03682-SCX) in accordance with the ICH Good Clinical Practice Guidelines, the Malaysia Good Clinical Practice Guidelines, and the Declaration of Helsinki. The informed consent was waived because this study design is a retrospective review.

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