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Observation on vascular malformation in respect of sclerotherapy as a treatment of choice

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ABSTRACT

Vascular malformations are a vast group of congenital malformations that are present at birth and can affect any type of vessels like artery, vein, and lymphatics. These malformations can cause pain, pressure, and cosmetic annoyance as well as downturn growth and development in a child in the case of high flow. Sclerotherapy has become an important tool in the treatment of vascular malformations. However, little is known about the success rate of sclerotherapy. In this study, the efficiency of sclerotherapy in the treatment of vascular anomalies was investigated retrospectively in 36 patients treated at Patna Medical College and Hospital, Patna between May 2017 and December 2018. Results: Out of the 36 patients investigated, 94% (34) had Venous Malformations (VMs) and 6% (2) were defined as having arteriovenous malformations (AVMs). Out of all VMs cases, 2(6%) VMs patients were operated. Hence 88% (32) of patients with a VMs received significant relief solely from sclerotherapy. The duration of treatment for the 6 % of the VM patients that needed a surgical procedure was prolonged by 5-7months. Sclerotherapy is an effective treatment modality for VMs with a satisfactory clinical response in 88% of cases.

Keywords— *VMs (Venous Malformation) CVMs (Congenital Veous Malformation), Sclerotherapy*

1. INTRODUCTION

It is estimated that the prevalence of vascular malformations (VMs) in the population is around 4.5%. VMs are congenital vascular malformations (CVMs) that are classified according to anatomical, pathological, and embryological criteria. The most used classification system is the Hamburg classification (also known as the ISSVA classification) from 1988 and it has become the standard system in the classification of congenital vascular malformations. This classification has since been updated in Colorado in 1992 and again in Rome in 1996.This system separates the malformations into arterial malformations (AMs), venous malformations (VMs), arteriovenous malformations (AVMs), lymphatic malformations (LMs), and capillary malformations (CMs) and combined vascular defects. These malformations are known to manifest in all parts of the human body. In addition, these malformations are present at birth; that is, they are congenital, but they usually induce clinical symptoms and findings associated with other diseases after childhood, in early adulthood, or in a later state of life by the influence of various factors such as trauma, infection, or hormones. Vascular malformations can cause a variety of symptoms depending on their anatomical locations as well as on the flow characteristics of the malformation. It is important to distinguish the different vascular anomalies from each other since the treatment of each type of anomaly differs from the other. A vascular malformation that has an arterial blood pressure (a so-called high-flow malformation, AM and AVM) is usually characterized by pain and a sense of pressure. In pediatric patients, a high-flow malformation such as AMs and AVMs can cause a downturn of growth and development since the malformation steals blood from the circulation. Low-flow malformations such as venous malformations (VMs) and lymphatic malformations (LMs) cause also problems such as dripping of lymphatic fluid or blood through skin and pain, inflict cosmetic annoyance, and exposes the patient to infection**.**Diagnosis of a vascular malformation is primarily clinical, but Doppler ultrasound and especially magnetic resonance imaging (MRI) has an important role in the diagnosis and characterization of the lesion. The treatment of an individual patient is evaluated by a multidisciplinary team that should be centralized in hospitals that have an adequate patient population. Treatment options can include minimal therapies such as elevation, compression garments, and aspirin whereas medical management of LMs can require antibiotics and steroids. However, the assessment whether to use surgical or interventional radiologic techniques is determined by several factors such as the anatomical site of the lesion, patient expectations, cost and the facilities at hand in a given hospital. Absolute indications for treatment of the CVMs include haemorrhage and hemodynamic problems such as high output cardiac failure or secondary ischemic complications caused by high-flow AV shunting.Sclerotherapy especially foam sclerotherapy has become an important tool in the treatment of vascular malformations. Sclerotherapy is conducted by a radiologist in ultrasound guidance by an injection of a sclerosant substance intravenously, such as polidocanol, sodium tetradylsulphate(STD).Sclerosant induces endothelial damage, inflammation, and eventually thrombosis of the vessel. This measure thus causes shrinkage of the malformation. The effect of sclerotherapy can be evaluated two months after the injection. Sclerotherapy of VMs have some complications like local pain and swelling. Rarely it causes necrosis of the skin and nerve injury. LMs are handled by an injection of avirulent Streptococcus Pyogenes bacteria (OK- 432, Picibanil). The injection of bacteria induces a strong inflammation inside the lymphatic vessel thus inducing atrophy of the vessel. CMs like portwine,strawberry hemangioma are often

treated by laser treatment. High-flow malformations such as AMs and AVMs on the other hand are treated with **surgical excision**. VMs are often complex in structure and penetrate through many tissue structures. Thus radical surgical removal of a vascular malformation would often result in too excessive procedure and tissue morbidity. In addition, the vascular malformation is likely to relapse in case of intralesional. Therefore, in the case of VMs, the method of treatment is sclerotherapy. Surgical excision can be performed if repeated sclerotherapies are failed to give resolution. Despite the vast research and the number of publications made in the field of sclerotherapies, there is not any study made on the effectiveness of sclerotherapies as a monotherapy in the treatment of vascular malformations. In this study, the success rate of sclerotherapy on the treatment of vascular malformations was investigated in patients treated in Patna medical college and Hospital between May 2017 and December 2018.

2. MATERIALS AND METHODS

The material covers for 36 consecutive patients. The material for this case study was collected from the patients treated with sclerotherapy for vascular malformation in the Patna medical college and Hospital between May 2017 and December 2018. Each patient was examined including: age, medical specialty in charge of treatment, sporadic or familiar malformation, single or multiple and anatomic lesions, any prior treatment, type of radiological imagining, nature of the malformation (venous, lymphatic, venolymphatic, capillary or arteriovenous), smoking, number of sclerotherapies, nature of the sclerosant that was used (polidocanol,STD, OK-432, ethanol, and glue), complications, and duration (follow-up) of treatment. The aim of the analysis was to find predisposing factors that will predict poor outcome in sclerotherapy

3. RESULTS

The 36 patients were arranged into two groups: patients that underwent a surgical procedure versus patients that did not. Patients were decided to be operated on if the result of the sclerotherapy was regarded as poor. These two patient groups were compared regarding the factors presented above) for a statically significant difference.In the Patna medical college and hospital, there were 36 patients treated with sclerotherapy for vascular malformation between May 2017 and December 2018. In this study, neither gender nor age was associated to be a predisposing factor for a poor result in sclerotherapy (Table 1). The treatment of the 36 patients was carried out by different faculties. Majority of the patients, 30 (83.33%) were treated by a general surgeon, 4 (11%) by a plastic surgeon and 2 (6%)by pediatric surgeons. There was evidence of family history only in the case of one patient; thus this patient was regarded as having a familiar venous malformation. This particular patient was treated altogether by 12 times of sclerotherapy and eventually, no surgery was performed.

Table 1: Results

Gender	
Male	16 (44%)
Female	20 (55%)
Operated on patients (all)	2 (6% out of high- and low-flow malformations combined)
Operated male	2 (6%)
Operated on females	0)
Operated on *low-flow* malformations	2 (6%)
The average age of all patients	30
The median age of all patients	33
The range of age of all patients	3-39
The average age of operated on	32
The median age of operating on patients	30
The range of age of operating on patients	6-57

Table 2: Anatomical location

Lower extremity	20 patients (55%)
Upper extremity	10 (27%)
Head and neck	3 (8.3%)
Torso	2 (6%)
Multiple locations	1 (2.7%)

Table 3: Complications: 8 patients (22%)

Pain	5 (13.8%)
Fever	1 (2.7%)
Haematoma	1 (2.7%)
Finger necrosis	1 (2.7%)

Hence, the nature of the malformation (sporadic versus familiar) was not associated to be a predisposing factor for a poor result in sclerotherapy. Single vascular malformations covered 80% (29patients) out of all patients; that is, in 20% of patients (7) the malformations were multiple. From the patients that were operated on (2), only one had multiple (low-flow) lesions. Thus whether the malformation was single or multiple, there was no association for a poor result in sclerotherapy. Table 2 illustrated the anatomical distribution of the malformations. In this study, the anatomical location of the malformation was not associated to be a predisposing factor for a poor result in sclerotherapy. Out of the patients investigated, 30% had a history of previous treatment for their vascular malformation. Out of the patients that were eventually operated on, 50% had a history of previous treatment for their vascular malformation. In all cases, the prior treatments were previous attempts of sclerotherapy. Identification of the malformation was done by Doppler USG in the 28 patients and MRI imaging in 8.

Out of the 36 patients investigated, 94% (34) had venous malformations (VMs) and 6% (2) were defined as having arterio-venous malformations (AVMs). Out of all VMs cases, 2(6%)VMs patients were operated. Hence 88% (32) of patients with a VMs received significant relief solely from sclerotherapy. The duration of treatment for the 6 % of the VM patients that needed a surgical procedure was prolonged by 7–9 months. The sclerosant agent polidocanol . However, 13.8% of the patients after sclerotherapy reported pain in the area of injection. See Table 3 for all complications reported . Majority of patients received sclerotherapy at the hospital and were discharged on the same day after sclerotherapy. No general anaesthesia was needed to conduct the sclerotherapies in any of the patients. Success from the 36 patients studied in this study, 20 (55%) were eventually operated on. This includes also all the patients with a high-flow malformation. Thus the majority of patients with a low-flow malformation received sufficient alleviation to their symptoms from sclerotherapy. Duration of treatments (i.e., follow-up) in all patients was 18 months on average. Treatment duration in patients that did not need surgery was 18 month. Treatment duration in patients that eventually underwent surgery was 25 months. The difference of treatment duration between operated on and non-operated on patients is therefore 7 months and it in folds a statistically significant difference between these two groups ($p = 0.001$).

4. DISCUSSION

In this study, the sclerotherapy was found to be an efficient method to relieve the subjective symptoms of a patient with VMs. From the 36 patients studied in this study, 6% (2) were eventually operated on. However, this includes also all the patients that had AM or AVM. This means that 86% of patients with a VM received adequate help to their symptoms solely from sclerotherapy. This is in level with earlier reports of the efficiency of sclerotherapy in the treatment of VMs. However, all AMs and AVMs did receive preoperative sclerotherapy before operation which is today considered the proper treatment protocol of such malformations. The indication for sclerotherapy in the cases of VMs is mainly the symptoms that the patient has (such as pain or a sensation of a lump or a true deformity); that is, it is rather subjective. However, in the case of AVMs, the indication is medically more objective since those malformations are prone to create risks and problems (such as stealing blood from the circulation) but also have more severe symptoms. Consistently the vascular therapy was considered successful if the patient subjectively experienced that the previous symptoms had been discharged through the sclerotherapy. In this study, there was only one actual complication reported: necrosis of finger that had to been amputated. This complication occurred as a result of the anatomical fact that there is quite limited endarterial vascular supply in fingers. Hence compromising the blood circulation by any means, such as with sclerotherapy, always in folds a risk of tissue necrosis. However, there were some adverse events reported in the cases of 8 patients (22%). These included pain (5 patients) and fever (1 patient) as well as haematoma in 1 patient. This proves that the consumption of sclerotherapy as a safe treatment option for vascular malformations. In this study, the efficiencies of each individual sclerosant agent were not compared with each other. However, despite the strength of that study, the review failed to identify an optimal sclerosant agent. Despite the fact that sclerotherapy is not a treatment that radically abolishes a VM, sclerotherapy still manages to reduce the size of a VM, hence reducing symptoms. In addition, sclerotherapy is a less invasive procedure than surgical operation, thus causing less tissue morbidity. Sclerotherapy has been estimated to be successful in 75–90% of cases. However, single sclerotherapy is seldom sufficient for adequate treatment response. Therefore, sclerotherapy may be applied several times before a satisfactory response has been obtained. The patients that did not receive adequate treatment response solely with sclerotherapy and underwent surgery. In this study, no statistical significance of patient age, family history, anatomical localization, the number of malformations, or the number of sclerotherapies could be found to explain or correlate with poor treatment response of sclerotherapy. In this study, the radiological size of the lesion was not marked up. In patients that were eventually operated on the median time was 25 months. There is a statistically significant difference in these durations ($p < 0.001$). In conclusion ,it can be stated that sclerotherapy is a well-tolerated and sufficient method in the treatment of VMs with a success rate of over 86%. In patients that will need complementary surgery, the duration of treatment lengthens by 5-7 months.

5. CONFLICT OF INTERESTS

The authors declare that there No financial interest or any conflict of interest exists

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