VASCULAR EMBOLOTHERAPY- HOW MUCH HAS BEEN ACHIEVED?

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ABSTRACT

Emergency and elective embolotherapy of various systemic arteries in 64 patients was carried out at a tertiary centre of Armed Forces. Specific indications were haemoptysis (n=43), preoperative (n=18), haematuria (n=1), epistaxis (n=1) and chemoembolization (n=1). The procedures were performed with gelfoam pellets (n=46), gelfoam pellets and absolute alcohol (n=1), polyvinyl alcohol particles (PVA) (n=14), steel coils (n=2) and Adriamycin-in-oil emulsion (n=1). Embolotherapy resulted in complete haemostasis in 37 (82.2%) out of 45 cases of haemorrhage. In eight cases (17.8%), it resulted in significant improvement. Complete haemostasis was achieved in both cases of haematuria and epistaxis. Pre-operative embolotherapy resulted in considerable reduction of peroperative blood loss in all the cases. Chemoembolization of Hepatocellular carcinoma resulted in partial regression of the tumour. The purpose of this study was to assess the efficacy, safety and reliability of vascular embolotherapy for control of life threatening haemorrhage and preoperative reduction of lesions.

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KEY WORDS: Embolization; Embolotherapy; Haemorrhage.

Introduction

The management of life threatening haemorrhage, vascular malformation and highly vascular tumors is always challenging and may require major surgical intervention. Since most of these procedures are performed in emergency on poor risk patients and associated with significant mortality and morbidity, alternative treatment options of vascular embolization has attracted much interest in the last decade. The development of catheter technology and embolic agents have led to tremendous upsurge of interest in embolization. These technical innovations have gradually redefined the indications of these procedures and most of these procedures are now undertaken as the primary treatment option.

We report our experience of 64 patients treated by vascular embolotherapy at Military Hospital (CTC) Pune during the period September 1995 to June 1998. We focus on the effectiveness, safety and reliability of these techniques in controlling life threatening haemorrhage and pre-operative reduction of vascularity of highly vascular lesions.

Material and Methods

Selective arterial embolization was performed in 64 patients (55 males, 9 females) whose age ranged from 21 years to 62 years (Average 29.4 years). The indications were medically uncontrollable haemorrhage in 45 patients. Pre-operative embolization in 19 patients and chemo-embolization in one case. The etiology of haemoptysis included tuberculosis (n=43), tuberculosis and asper-

gilloma (n=7), bronchiectasis (n=7) and lung tumors (n=2). The indications for pre-operative embolization were tuberculosis with aspergilloma (n=7), bronchiectasis (n=7), lung tumors (n=2) and nasopharyngeal angiofibroma (n=2). (Table-1).

TABLE 1
Indications for embolotherapy (n=64)

Indication	No. of patients
Haemoptysis	43
Haematuria (iatrogenic)	01
Epistaxis (post traumatic)	01
Pre-operative	18
Tuberculosis and Aspergilloma	07
Bronchiectasis	07
Nasopharyngeal angiofibroma	02
Lung tumour	02
Chemoembolization	01

Transfemoral approach was used in all the cases for vascular access and the arteries were selected on the basis of arteriographic information. Gel foam pellets (n=46), gel foam pellets and absolute alcohol (n=1), Polyvinyl alcohol (PVA) particles (n=14), steel coils (n=2) and Adriamycin-in-oil emulsion (n=1) were used as embolic material (Table-2).

The effectiveness of embolization was determined with either complete response (CR): no bleeding after embolotherapy, Partial response (PR): obvious decrease in volume and frequency of bleeding, No change (NC): no control of haemorrhage. In pre-operative embolization of vascular tumors, success was assessed depending upon significant decrease in the volume of blood loss at the time of surgery. In addition, success of chemoembolization of hepatocellular carcinoma (HCC) was assessed on the basis of re-

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TABLE 2

Embolic material used for embolotherapy (n=64)

Embolic material	No. of patients
Gelfoam pellets	46
Polyvinyl alcohol particles (PVA)	14
Gelfoam pellets and absolute alcohol	01
Steel coils	02
Adriamycin-in-oil emulsion and gelfoam	01

gression of tumor size.

Results and Observations

The angiographic findings of pulmonary haemorrhage were extravasation of contrast in 5 patients (8.4%), hyper-vascularization in 55 (93.2%), bronchopulmonary shunts in 29 (42.3%). Aneurysms were encountered in 3 cases (4.7%) in bronchial artery, pseudo-aneurysm of maxillary branch of internal maxillary artery and lower pole segmental branch of renal artery in one case each. Tumor neovascularity was seen in 4 cases (6.3%).

A total of 223 arteries were successfully embolized: 49 right and 66 left bronchial arteries, 33 intercostal arteries, 28 internal mammary arteries, 12 lateral thoracic arteries, 3 costocervical, 15 right and 6 intercosto bronchial trunks (IBCT), 3 internal maxillary arteries, 1 lower pole renal artery and one accessory hepatic artery.

The procedure was completely successful (CR) in 37 patients (82.2%) and partially successful (PR) in 8 patients (17.7%) with life threatening haemorrhage due to haemoptysis (n=43), epistaxis (n=1), and haematuria (n=1) [Table-3]. All 8 cases with partial response had haemoptysis due to multidrug resistant pulmonary tuberculosis. Embolization however, resulted in significant reduction in severity of haemoptysis. In all the cases of pre-operative embolization, peroperative blood loss was considerably reduced which facilitated surgery. Hepatocellular carcinoma (HCC) regressed by 30% within two weeks of chemoembolization.

TABLE 3

Response to embolotherapy (n=64)

Indication	Response			Total
	CR	PR	NR	
Haemoptysis	35	08	—	43
Pre-operative	18	—	—	18
Haematuria	01	—	—	01
Epistaxis	01	—	—	01
Chemoembolization	01	—	—	01
Total	56	08	—	64

Case-1

This 11-year-old boy presented with bilateral nasal obstruction. Clinical and rhinoscopic examination confirmed a large nasopharyngeal mass. Computed Tomography revealed a large markedly enhancing nasopharyngeal mass consistent with nasopharyngeal fibroangioma. He was taken up for preoperative elective embolization to reduce tumor vascularity. Selective bilateral internal carotid angiogram did not reveal any feeding vessels to the tumor. However selective right internal maxillary arteriography confirmed highly vascular nasopharyngeal mass exhibiting capillary blush, neovascularity and large draining vein (Fig-1). Se-

Fig 1 : Selective right internal maxillary arteriogram revealed highly vascular nasopharyngeal mass exhibiting neovascularity and large draining veins (marked by arrows)

Fig. 2 : Post embolization check angiogram showing near total obliteration of tumour vascularity

lective embolization of this vessel resulted in near total obliteration of the vascularity (Fig-2). This highly vascular tumor was successfully excised 48 hours later with per-operative loss of only two units of blood.

Case-2

This 21-year-old male presented with recurrent episodes of massive haemoptysis necessitating eight units of blood transfusion in past two months. His chest radiograph was normal. High Resolution Computed Tomography of the thorax revealed bronchiectasis of posterior basal segment of right lower lobe. Emergency bronchial artery arteriography revealed markedly hypertrophied and tortuous right bronchial artery supply hypervascularity to the bronchiectatic post basal segment of right lower lobe (Fig-3). This abnormal bronchial artery was embolized with polyvinyl alcohol foam particles. Post embolization angiogram revealed successful embolization (Fig-4). Patient has remained asymptomatic during follow-up of nine months.

Discussion

Embolotherapy for control of medically uncontrollable haemorrhage and reduction of tumor vascularity pre-operatively is a well established procedure

Fig. 3: Selective right bronchial arteriography revealed hypertrophied, tortuous artery supplying hypervascularity to bronchiectatic segment

[1]. Though principle of vascular embolization dates back to 1904 [2], it has only been in the last decade that it has attracted much interest. In view of the technical advancements in catheter technology (co-axial, micro-catheter and trackers etc) and embolic material, embolotherapy has now emerged as a primary mode of therapy in management of vascular anomalies, post-traumatic bleeding, haemorrhage from viscera (eg. kidney, liver, spleen), pelvis and extremities etc [3-6].

Angiography is superior to surgical alternative both as a diagnostic as well as a therapeutic modality since presence of large haematoma and continuous extravasation of blood makes examination of a surgical field difficult specially, if the lesion is surgically difficult or in an inaccessible area. Treatment with super-selective embolization may not only salvage the organ but may achieve clinical cure with minimal loss of tissue. Embolization can also be used as a pre-operative therapy for organ ablation (eg. splenic embolization to improve platelet function) or as an alternative to surgery in patients with end stage renal disease or intractable renovascular hypertension, or both as pre-operative and palliative aims in primary and metastatic vascular tumors eg. Renal cell carcinoma, vascular bone tumors, and bone metastases.

Embolotherapy is the primary treatment option for certain aneurysms and benign tumors particularly where resection would require a crippling major operation or when the tumor is in poorly accessible part of the body such as spine [7]. Transcatheter oily chemoembolization (TOCE) has been proved to be a safe treatment option with excellent histopathological improvement and long term results in patients with unresectable hepatocellular carcinoma [8].

Fig. 4: Post embolization arteriogram showing the faint cast (of contrast and gelfoam pellets) of the embolized artery confirming successful occlusion of abnormal artery

Post embolization syndrome (PES) includes fever, nausea, vomiting and pain which occurs in almost all the patients, lasts for 1-5 days and usually only requires antibiotics and symptomatic treatment. In our study, PES was mild and no major complications were encountered.

The present study highlights that vascular embolotherapy is safe, reliable and effective in management of life threatening haemorrhage and in pre-operative reduction in tumor vascularity.

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