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Original Research Article

Hepatic artery embolization for treating giant hemangioma of liver: an experience from a tertiary level hospital in India

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ABSTRACT

Background: Transcatheter hepatic artery embolization (TAE) is a minimally invasive procedure. This study aimed to assess radiological features of giant haemangioma of liver on untrasonography, contrast enhanced tomography, magnetic resonance imaging and digital subtraction angiography, to assess the safety, feasibility and efficacy of transcatheter arterial embolization of hepatic artery in giant liver haemangioma.
Methods: This prospective study was conducted in the Interventional Radiology Department, Government Medical College Nagpur from September 2013 till August 2015. Patients were enrolled who were diagnosed with liver hemangioma after obtaining an informed consent. Patients underwent routine investigations and imaging modalities like ultrasonography, contrast enhanced computed tomography. Patients were followed up at 3 months and 9 months.
Results: During the study period, 28 patients were enrolled, 9 males, most common age group being 31-50 years. Abdominal discomfort was the most common symptom. Majority of the lesions were hyperechoic and not vascular. On CECT most of the lesions appeared progressive centripetal. On DSA heaptic artery was the most common source of vascular supple. Statistically significant change in size of the lesion was observed on either lobe when imaged via USG or CECT. No long term complications were seen in majority of the patients.
Conclusions: This study shows that TAE in Giant Hepatic Haemangiomas is safe, feasible, efficient, and minimally invasive with good patient acceptance, minimal complications and no mortality.

Keywords: Computer tomography, Embolization, Hemangioma, Treatment

INTRODUCTION

Transcatheter hepatic artery embolization is an interventional radiological technique. It is minimally invasive procedure and can be done within much less time on patients and is not associated with significant morbidity when compared to open surgical procedures. Haemangioma is one of the most common benign tumour of liver, accounting for 0.4-7.3% of all space-occupying hepatic lesions.[1] Diagnosis of haemangioma can be made using various modalities like ultrasound, contrast enhanced computed tomography, magnetic resonance imaging, technetium (Tc) 99m-labeled RBC scanning, digital subtraction angiography. However, histopathological diagnosis using fine needle aspiration or biopsy is not recommended as due to risk of rupture and bleeding is high.

The modalities for management of giant hemangiomas include corticosteroid therapy, radiofrequency ablation, hepatic artery ligation, intra-arterial embolization, anatomic liver resection, enucleation, and rarely liver transplantation.[2] Surgical liver resection or enucleation are effective curative treatment for giant haemangiomas, however considering the risk of massive intraoperative bleeding and following shock, surgery should be

considered only for patients with established complications, diagnostic uncertainty and incapacitating symptoms, where operative risk is acceptable. Endovascular management in the form of trans-arterial embolization (TAE) is offered in cases of symptomatic haemangiomas, unresectable haemangiomas i.e., involving both lobes, as a pre-operative temporizing procedure in ruptured hemangiomas, in diffuse hemangiomatosis, in progressively growing hemangiomas and those at high risk of bleeding. Transcatheter Arterial Embolisation has now found a unique place in the treatment alternatives of in giant liver haemangioma.[3] It is safe, minimally invasive, effective and good alternative to surgery in giant liver haemangioma. It has few complications and good outcome.

This study aimed to assess radiological features of giant haemangioma of liver on USG, CECT, MRI and DSA, to assess the safety, feasibility and efficacy of transcatheter arterial embolization of hepatic artery in giant liver haemangioma and to evaluate post procedure complications and follow up examinations for a period of around 9 months for assessing size and appearance of lesions on ultrasound and contrast enhanced computed tomography.

METHODS

A prospective study was designed to be conducted in the Intervention Radiology Unit, Department of Radio diagnosis, Government Medical College Nagpur, Maharashtra, India for a period of 2 years (September 2013 to August 2015) with a sample size of 29 patients. The study includes patients with certain diagnosis of giant haemangioma of liver either single or multiple. Subjects were selected by pre-procedural imaging diagnosis using ultrasound, abdominal computed tomography or/and magnetic resonance imaging and after prior investigations were subjected for Transcatheter hepatic artery embolization. Detailed history of patients was collected including medical history, personal history.

Inclusion criteria

In this study we decided to include all giant hemangiomas detected on USG, CT or MRI in symptomatic patients, giant hemangiomas incidentally detected on USG, CT or MRI in asymptomatic patients with undue risk of rupture. Any known cases of giant hemangiomas with transcatheter arterial embolization or resection done and presenting with recurrence/relapse/ not responding to treatment were included as well and so were ruptured/complicated giant hemangiomas as intratumoral bleed.

Exclusion criteria

We excluded patients with hemangiomas <4cm in size, those patients with uncertain diagnosis. (e.g. Patients who are diagnosed as haemangioma on USG, but on CECT or MRI not showing features of haemangioma are excluded), patients with portal vein thrombosis, general contraindications to angiography, intolerance of contrast media, peripheral vascular disease, hemorrhagic diathesis (INR>1.4), deranged renal functions (serum creatinine >1.5mg/dl) and extremely debilitated and terminally ill patients.

Data collection and analysis

Each patient included in the study underwent standard laboratory investigations; Coagulation profile (PT, aPTT, INR), platelet count, haemoglobin and haematocrit, HIV and HbSAg status, Liver and renal function tests. Any relevant medical history regarding allergies to various medications was noted as well. Immediate post procedure compression was given for 10 minutes at the site femoral puncture to stop bleeding and a dressing was applied. The patient was reassured and blood pressure, pulse rate and respiratory rate were monitored. In case of pain oral analgesics were given. All patients were monitored postoperatively (Vital signs, oxygen saturation) with particular attention paid to the lower limb skin temperature and colour and dorsalis pedis pulses. The patients were followed up for around 9 months to observe for change in tumour size, appearance on ultrasound, CT imaging and symptoms.

Data was collected, tabulated and entered in Microsoft excel sheet. This data were imported in SPSS software for generating descriptive analysis and other statistical analysis were conducted as appropriate.

RESULTS

In this study, only those patients who were diagnosed as Giant haemangioma of liver on CECT and MRI are included, 1 patient who initially diagnosed as giant haemangioma on USG, suggestive of hepatocellular carcinoma on CECT, is excluded from study. So only 28 patients were included in the final analysis.

Table 1: General characteristics of the patients included in the study.

Characteristics	Number
Total number of patients	28
Males	9
Age group distribution	
21-30 years	2
31-40 years	10
41-50 years	10
51-60 years	6
Symptoms	
Abdominal discomfort	11
Abdominal pain	6
Incidental finding	10
Jaundince	1

Of the 28 patients 9 were males; most common age group was 31 to 50 years of age (Table 1). Abdominal discomfort was the most common complaint of the patients. The characteristics of the lesions as seen on ultrasonography and contrast enhanced computed tomography can be studied in Table 2.

Table 2: Ultrasonography and contrast enhanced computed tomography findings.

Imaging modality	Number of lesions	Average size noted (cms)	Appearance
USG	One: 13 Two: 6 Three: 6 Four: 2 >Four: 1	Right: 10.68±6.29 Left: 6.7±4.33	Heterogeneously hyperechoic: 13 Heterogeneous: 7 Hyperechoic: 2 Echogenic: 2 Hypoechoic heterogeneous rim: 4
CECT	One: 10 Two: 5 Three: 8 Four: 4 >Four: 1	Right: 10.05±4.03 Left: 6.80±4.43	Progressive Centripetal Gradual Filling: 27 Peripheral Contrast Enhancement: 1

Table 3: Vascularity of the lesions as seen on USG and DSA.

Ultrasonography	Minimal vascularity: 13
	Mild vascularity: 3
	Not vascular: 12
Digital subtraction angiography	Hepatic artery: 25
	Hepatic artery, aberrant hepatic artery, inferior phrenic artery: 1
	Hepatic artery, aberrant hepatic artery, superior mesentric artery: 2

This table gives a description of the number of lesions, average size of lesions and appearance. Vascularity of the lesions was noted on ultrasonography and digital subtractions angiography (Table 3). Most of the lesion show no to minimal vascularity on USG. Mild vascularity was seen in only 3 (11%) cases. Change in the size of the lesions in right or left lobe as seen on USG and CECT over 3 and 9 months follow up are described in Table 4. All the changes in size of the lesions were statistically significant. We also noted change in the appearance of the lesions as seen on USG on 3 and 9 months follow up (Table 5).

Table 4: Change in the size of lesions (in cm) as noted on USG and CECT.

Imaging modality	Right lobe		Left lobe	
	Pre TAE* – 3 month follow-up	Pre TAE – 9 month follow-up	Pre TAE – 3 month follow-up	Pre TAE – 9 month follow-up
USG	2.03±4.18 (p<0.0001)	3.30±2.24 (p<0.0001)	0.36±1.24 (p<0.001)	0.80±3.44 (p<0.001)
CECT	1.49±1.22 (p<0.0001)	2.56±1.53 (p<0.0001)	0.66±0.79 (p<0.001)	1.08±1.61 (p<0.001)

*TAE = transcather arterial embolization

Table 5: Change in the appearance of lesions on ultrasonography.

Appearance	Pre TAE (N=28)	3 Month follow up (N=28)	9 Month follow up (N=28)
Heterogeneously hyperechoeic	13 (45%)	--	--
Heterogenous	7 (25%)	2 (7.1%)	--
Hypoechoeic with hyperechoeic rim	4 (14%)	--	--
Hyperechoeic	2 (7.1)	6 (21.4%)	--
Echogenic	2 (7.1%)	20 (71.4%)	2 (7.1%)
Hypoechoeic	--	--	26 (92.8%)

Post TAE complications were relatively rare (Table 6). Most of the patients had on significant long term complications.

Table 6: Post transcather arterial embolization complications.

Complications	Number
Fever and pain	6
Abdominal pain	4
Increased cell count	4
Puncture site hematoma	1
Abscess	1
No long term complication	27

DISCUSSION

Transcatheter Arterial Embolization has now found a unique place in the treatment alternatives of giant liver haemangiomas. It is safe, minimally invasive, effective and good alternative to surgery in giant liver haemangioma. It has few complications and good outcome. Fears about surgical risk and high intra operative blood loss is avoided. This study was designed to determine safety, feasibility and efficacy TAE and radiological features of giant haemangioma of liver.

Most common age group we observed was 31 to 50 years with mean age group 42.10 years and more common in females with female to male ratio of approximate 2:1 which is in concordance with Gandolfi L et al and Wilson WC Ng et al in present study 64% of the patients were symptomatic.[4] Schwartz SI et al found that 67% of the patients were symptomatic and Ho, Hui-Yu, et al reported that in their study 59% of the patients were symptomatic.[6]

We observed that most of cases are hyperechogenic in appearance (76%) which is comparable with Gandolfi L et al.[4] According to Machado MM et al, Toro, Adriana et al and SunJ-H et al, giant Haemangioma appears as well defined, heterogenous, hyperechoeic with posterior acoustic enhancement on posterior wall.[8] Some lesions have hypoechoeic centre in comparison to peripheral rim. Colour Doppler ultrasound showed no to minimal flow in most of haemangiomas. Some haemangiomas had unusual findings as cysts or calcifications within. Haemangiomas do not present with any hypoechoeic halo around the lesion. These findings are comparable with present study. Vilgrain et al, Prasanna et al and Toro, Adriana et al concluded that the computed tomographic (CT) findings consist of a hypo attenuating lesion on non-enhanced images.[9,11,12]

After intravenous administration of contrast material, arterial-phase CT shows early, peripheral, globular enhancement of the lesion. The attenuation of the peripheral nodules is equal to that of the adjacent aorta. Venous-phase CT shows centripetal enhancement those progresses to uniform filling. This enhancement persists on delayed-phase images. Similar findings seen in 85% cases of present study. MRI was not done in all patients. It was done in 4 cases only. MRI show T1W images as hypointense and isointense in 2 cases each, T2W images appeared as hyperintense in all 4 cases and T1W contrast sequence show progressive centripetal gradual contrast filling in all 4 cases.

According to Vilgrain et al and Prasanna et al, lesions demonstrate low signal intensity on T1-weighted images and markedly high signal intensity on T2-weighted images; these signal intensity characteristics are likely due to slow flow within the lesion.[11,12] Hypointense internal septa and central scar are commonly seen in giant hemangiomas. Gadolinium-enhanced imaging demonstrates three patterns of enhancement, which are similar to those of CT. The first pattern is immediate homogeneous enhancement, which represents so-called flash-filling hemangiomas. The second pattern is the classic peripheral nodular enhancement with centripetal filling. The third pattern is similar to the second, with the exception of a persistent central area of low signal intensity. MR imaging also has high sensitivity (98%–100%) and specificity (92%–98%) in the diagnosis of hemangiomas.

As such no significant complications were noted in present study. Post embolization syndrome in form fever, leucocytosis in 21 % patients which was relieved after symptomatic treatment. Abdominal distention and liver pain occurred in 14% patients, may be due to embolization of tumour vessels, drug action and ischemia. On long term follow up, abscess formation occurred in 1 patient. Immediate complication rate 46% in present study which is comparable with study done by Sun J-H et al.[10]

Srivastava DN et al, Deutsch GS et al and Mohan S et al studied that TAE is safe and effective therapy for haemangiomas, however no significant change in tumour size noted.[13-15] Zeng Q et al , Firouznia K et al and Panis Y, et al found that significant reduction in tumour size of all patients and symptomatic relief in almost all patients.[16-18] In present study, we found significant reduction in tumour size and symptomatic relief in all 28 patients. Present study is comparable with studies done by Firouznia K et al and others.[17]

CONCLUSION

In the prospective and retrospective study carried out on 28 patients, the detection rate of ultrasound and CT is 71.4% and 96.5% respectively. Hence, Ultrasonography and CT are good modalities for diagnosing Giant Hepatic Haemangiomas.

As there were good results in form of symptomatic relief and reduction in size of lesions, TAE is an effective in management of patients with Giant Hepatic Haemangiomas. Thus, to conclude TAE in Giant Hepatic

Haemangiomas is safe, feasible, efficient, and minimally invasive with good patient acceptance, minimal complications and no mortality.

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