Role of MDCTA in Bronchial Artery Embolization in patients with Hemoptysis

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Abstract

Objective: To evaluate the role of bronchial artery MDCTA in bronchial artery embolization in the treatment of haemoptysis patients. **Methods:** 46 patients treated with bronchial artery embolization for haemoptysis was included in the study at 1st Affiliated Hospital, Jinzhou Medical University. They were classified into 2 groups, Group A-Preoperative CTA and Group B -Simple DSA. Group A (n=28) is those with preoperative CTA examination performed, while group B (n=18) is those who performed DSA directly without preoperative CTA. The results of CTA and DSA, technical and clinical outcome compared and analyzed. **Results:** 48 bleeding arteries were identified in group A while 24 bleeding arteries were identified in group B. These arteries were embolized successfully. In the group A total fluoroscopy time, total operative time, and contrast dose were shorter than group B respectively (8.42± 2.82; 28.34± 5.61; 27.86± 6.42 VS. 18.46± 10.34; 40.27±16.32; 62.59±19.48). **Conclusion:**Bronchial artery CTA can objectively evaluate haemoptysis associated with vascular origin, number and its shape and it can reduce the operative time and reduce the radiation exposure to doctors and patients too, it increase the success rate of haemoptysis interventional therapy guidance has wide clinical application value.

Keywords: **M**ulti-detector CT angiography, bronchial artery embolization, DSA

Introduction

Severe is one of the dangerous conditions caused by polyetiologies [1]. Bronchiectasis, Lung Cancer, Cystic fibrosis and Aspergillosis were identified in developed country as the major cause of Haemoptysis [2]. Additional risk factor includes pulmonary emboli (chronic), heart disease (Congenital or Acquired), interstitial fibrosis, trauma, inflammatory conditions (chronic) [2, 3, 4]. Severe haemoptysis is coined as amount of expectorated blood ranging from 100-1000ml but universally no confirmed amount is verified. Amount of blood loss may not be large volume but that can threatens the patient life is defined as severe haemoptysis [2, 4].

Massive and recurrent haemoptysis is managed by a non surgical procedure called Bronchial Arterial Embolization [5, 6, 7]. To plan or, perform bronchial

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artery embolization, the defined information of bleeding spot, severity, cause and its mechanism are vital. Bronchial arteries accounts for 90% of all cases of haemoptysis while pulmonary artery (origin) accounts for 10% [8]. Recurrent bleeding after successful BAE is due to either Non bronchial or Systemic arterial source. The bronchial and non bronchial arteries, in terms of origin, branching type and route they have variable anatomy. Bronchial artery anomalous origin ranges from 8.3% to 35% [9]. This changeability may be the cause of, treatment failure, several times examinations, and the examinations of long duration.

The CT play important role in severe haemoptysis patients needed specific treatment, by locating the site of bleeding and the cause of haemoptysis [10-12]. In the advancement of new technique in CT has shown the effectiveness to predict the origin of hemorrhage from bronchial and pulmonary arteries, on contrast CT or helical CT anatomic characteristics of enlarge bronchial arteries were limited [13].

MDCT is non invasive imaging modality which can evaluate lung parenchyma, airways and thoracic vessels by using contrast material [14]. It identifies bleeding source in 63%-100% and underlying cause of haemoptysis e.g. in bronchiectasis, pulmonary infections, lung cancer [11, 15]. Prior inform by MDCTA reduce the procedure time, reduce the iatrogenic risk of searching abnormal vessels, minimize contrast load and radiation of patients and operators [16]. MDCT has decreased the respiratory motion artifacts and improve image quality [17]. It can differentiate bronchial and non bronchial systemic arteries in multiple planes and combining reformatted images [5-7]. Lately according to some studies before endovascular treatment MDCTA has proven useful procedure for localization of bronchial and non bronchial arteries [5-7, 18, 19]. Whereas some other studies had also showed that MDCTA is good diagnostic method for understanding the mechanism of haemoptysis with pulmonary artery involvement. MDCTA can forecast difficulties in the treatment of patients [8, 20]. A study done by Gupta et al. showed the usefulness of MDCTA before BAE [21]. In aged patients may have tortuous aorta and extensive arteriosclerosis, MDCT is useful for visualizing bronchial arteries and detecting ectopic origins [18, 19].

DSA is used as diagnostic and therapeutic tool for haemoptysis. Nowadays in detecting the origin of haemoptysis DSA has marginal role as diagnostic modality. But in some cases DSA may be performed for diagnostic purpose only e.g. in patients with sequestration [14, 21]. At angiography, all the feasible sources of the bronchial arterial supply may be ambitious. It can either miss or not locate extra thoracic branches or non bronchial arteries as main source of bleeding [19]. Yoon et al. and Remy Jar din et al. suggested that bronchial arteries can be correctly defined by MDCTA rather than conventional Angiography.

So, Once MDCTA has been completed then only DSA is used for bronchial artery embolization. The main aim of the study is to analyze the role of multi detector row computed tomography angiography (MDCTA) before bronchial artery embolization in patients with haemoptysis and to correlate with the digital subs traction angiography.

Materials and Methods

Type of study: Prospective study.

Study settings: Department of Interventional Radiology of the first affiliated hospital of Jinzhou Medical University.

Duration of study: From December 2015 To May 2017

Patients Study Design

After obtaining approval from the hospital ethics committee and after taking informed consent from the patients, forty six patients were enrolled in the first affiliated hospital of Jinzhou Medical University from December 2015 to may 2017, by fulfilling the inclusion criteria in the department of Interventional Radiology for bronchial artery embolization (BAE). The forty six cases of haemoptysis who were candidates for bronchial artery embolization were divided into two groups. Group A, who were underwent preoperative CTA and Group B, simple DSA group. Group A, 28 patients underwent CTA before interventional embolization to find the arteries responsible for bleeding, and then bronchial artery embolization treatment. Group B 18 patients were directly underwent BAE treatment without prior CTA.

The clinical charts of the 46 patients were reviewed for the patients, age and sex, initial clinical presentation and vital signs, volume, causes and mechanism of haemoptysis. 24 hrs assessment of blood volume for Haemoptysis was done (100-800ml). Before CTA the vital signs of patients were assessed, especially in patients with massive haemoptysis .To be ensured that vital sign is stable and to avoided delay in treatment. All patients underwent routine examination, including blood cell analysis, coagulation profile, liver and kidney function test and other routine laboratory test and chest CT

Inclusion Criteria

- Age- All Ages
- Sex- Male/female
- Patients with acute severe haemoptysis (Volume of 100-800ml/24hr)
- Patients with recurrent haemoptysis
- And MDCTA confirmed cases

Exclusion Criteria

- Contraindication for the CTA (History of renal disease, liver disease, heart disease, heart failure)
- Pregnant women
- Allergic to contrast
- Patient's refusal
- Patients on beguanide drug

Imaging Equipment

- **Contrast agent**-Bayer Ultravist, 37D (Ultravist370, Leproma ipromide injection (Bayer), Schering Pharma AG, Berlin, Germany).High Pressure Syringe was used to inject 80-90 ml at speed of 30-40ml/s.Scanning delay time was set for 20-350.
- **Spiral CT**-Light speed VCI scanning system(64 Slice CT) produced by American GE Company(GE Healthcare,Piscataway,NJ,USA).
- **Scan Range**-Scanning starts from the suprasternal fossa of 3.4 cm(C6) to the bottom of lung(T11).Scanning parameters was set at rotating speed of 0.32SD weeks,125-140Kv tube voltage. Tube current (250-350mA),Pitch(0.984),Thickness(0.625mm).Interval(625mm),Display(350),Matrix(512*512).
- **Image Reconstruction and Analysis of the Scanned Image**-Image Data is transmitted to the GEAW 4.2 at workstation for post-processing. The use of MIP, VR, SSD,

MPR, CPR and Other reconstruction method, rotation angle, Add/Remove Structure, Segmentation, Combination was done for identification of Shape of BA, Distribution, Origin and course in this group.

- **Interventional Material**-Gelatinous Sponge particle embolic agent produced by Hangzhou Alicon Pharm SCI and TEC Co. LTD. PVA 300(Particle size 300-500 um) and PVA-500(Particle size 500-700 um)
- **DSA**-According to preoperative CTA display result, descending the BA cannula at DSA: puncture at groin area by using seldinger technique of unilateral Femoral artery and inserted into the 6F artery sheath. According to patients condition 5F JUDKINS LEFT (4.0 cm) catheter was used, Mike Catheter or Lt gastric artery catheter can be molded in necessary which is suitable for patients with aortic with and morphology of BA(According to my experience ,while working with Mike catheter it was more easily introduced into the BA opening)

Methods of CT examination and bronchial artery embolization

Group A, the patients without MDCT angiography

With the patient in the supine position, single detector helical CT-The examination was performed by using a single- detector helical CT (SR700 CT scanner, Phillips healthcare). From the lung apex to the lung bases two acquisitions were carried out. One was a sequential HRCT with slice thickness 1mm every 10mm and other was unenhanced CT with slice thickness of 5mm. The images were reconstructed on meditational and lung window setting. In this group exploration begun with thoracic aortography. Right femoral artery catherization was done by seldinger technique through an introducer sheath. The tip of a 5F pigtail catheter (Angioflex, Biosphere Medical) located at the origin of the ascending thoracic aorta in front of the coronary arteries, vessels arising from the aortic arch and arteries arising from the descending thoracic aorta, and inferior phrenic arteries. The acquisition was performed with a poster anterior incidence, a field view of 40x40 cm, andn40 ml of contrast medium administrated at a rate of 20 ml/ s.

Group B, the patients with MDCT angiography

The demographic information including name, age and address of the patients was taken. MDCT angiography of the bronchial and non bronchial systemic artery and pulmonary artery was performed by using 64 detector row CT scanner (Brilliance 64, Phillips, Netherland). Vertebral body and at maximum inspiration a single breath hold. The imaging parameters for all patients were 120 kvp, from the lung apices to the level of the renal arteries patients were scanned in crani-caudial direction in supine position, roughly 2^{nd} lumbar 60 to 100 MAS, rotation time of o.5 sec. collimination of 0.75 mm and pitch of 1.5. The mean height of the volume scan is 350mm and the mean duration of data acquisition was 10 sec. In all patients, 80 to 100 ml of contrast material (Iohexol, omnipaque TM 350 (each ml. contains 350 mg Iodine), and 40 ml of saline was infused through antecubital vein, with an injection rate of 4ml per second. The automatic bolus triggering software was used. At the level of ascending aorta with a thresh hold volume of 100HU circular region of the interest was placed. When the contrast enhancement of descending aorta reached 100HU after 6 sec scanning is automatically initiated .Three series of images were constructed for each data set.

Image Analysis

For the each data set, the following images are constructed

1. Transverse CT scan of 1 mm thick is analyzed at meditational and lung windows
2. Oblique, coronal, and saggital maximum intensity projection
3. 3D VR images thoracic vascular structure

In all the patients the possible causes of bleeding and location of bleeding site within lung parenchyma is carefully studied in detail with 5mm transverse scans. At the mediastinal window on axial 1mm thick scans the origin of bronchial artery were depicted. Parallel to the axis of their origin of the diameter of the ostium of bronchial arteries were measured on the transverse and multiplanar reconstruction images (MPR). Assessment of mediastinal course of bronchial artery was done by MPR imaging and traced out to the hilum.VRT and MIP was used for 3D rendering of bronchial artery and combined to form a single image of bronchial artery. Bronchial arteries (Origin), total number of bronchial arteries, side and level of their origin and their diameter were analyzed. All the non bronchial arteries were also assayed. If systemic arteries were demonstrated enlarged within the extra pleural fat in association with pleural thickening (>3mm) were regarded as causes of haemoptysis.

Pre-procedure Evaluation and Work-up Pre-procedure work up was performed with the aim of clarify the cause of haemoptysis and to guide to localization of endovascular treatment. Other sources of bleeding e.g. from the nasopharynx, gastrointestinal tract, and from the oropharynx were excluded. Pre-procedure MDCTA and other investigation were obtained to achieve directed and efficient procedure, with the less time and increased safety while performing bronchial artery embolization. In dyspnea patient the oxygen mask was used during bronchial artery embolization and selective intubation of bronchi to keep the airway patency. Throughout study is done before BAE to detect any spinal cord ischemia by repeatedly checking lower extremities motor and sensory function.

Bronchial Artery Embolization

Bronchial artery embolization was performed in the high resolution digital substraction angiograph (DSA) in interventional radiology department. A primary descending aortogram was obtained as a road map to bronchial arteries. Under local antiseptic preparation and after local anesthesia over groin 5F-French vascular sheath was introduced in femoral artery. Through the 5F-French vascular sheath a suitable 4For 5F catheter (Pigtail catheter) was placed in the proximal descending aorta on the digital subs traction angiography (DSA) thoracic overview images were obtained, by using 30ml iodine contrast material at the rate of 20ml/sec. To obtain systemic depiction of the bronchial arterial outlet from the aorta anterioposterior left anterior oblique (LAO), right anterior oblique (RAO) projection were obtained. Seldinger technique used 0.35 guide wire. The ostium at all bronchial arteries were located with either 4F or 5F catheter (Cobra). Then contrast agent (5-6ml) was given manually and displayed on DSA ventromedially from the descending aorta the ostium of the right bronchial artery or right ICBT arise. At the level of 4^{th} to 8^{th} thoracic vertebra the left bronchial artery arise ventrally from the descending aorta. As we know spine is frequently supplied by branches of ICBT, hence low osmolar contrast in small quantity was used to reduce the risk of spinal ischemia. The diameter of bronchial artery> 2mm diameter of bronchial artery, tortuous course of the bronchial artery, the presence of the systemic pulmonary arterial or venous shunts, hypervascularization zones, contrast agent extravasations, aneurysm are source of bleeding were assessed. In bronchial arterial, pulmonary venous or pulmonary arterial shunts after risk assessment of a possible systemic embolism or after ruled out of bronchus supplying the spine the arteries were embolized. Prior to the selective bronchial artery embolization spinal branches cannot be seen, only seen in the course of embolization as a result of blood flow redistribution. Avoidance of embolic agent reflux into aorta or spinal branches must be noted. The successful procedure was assayed on the basis of retrograde blood flow within the bronchial artery had been ceased or > 95% of the peripheral vascular branches had been embolized. BAE success was identified by additional aortogram with no contrast of lung arterial branches. The causes of haemoptysis like pulmonary artery aneurysm or pulmonary arterio-venous malformation (PAVM) were ruled out.

Statistical Analysis

Statistical analysis was done by SPSS 16.0 software. The two groups of data measurement were expressed by mean ± Standard deviation. The independent sample t- test is used between the two groups. When the value of p is < 0.05, then the difference is statistically significant.

Result

The displayed blood vessels were responsible for haemoptysis. Forty-six patients with haemoptysis were treated with modified Seldinger technique for angiography, out of which 28 patients underwent CTA prior to DSA. CTA and DSA had clearly shown the abnormalities of the bronchial arterial lesion. The main imaging findings are: thickening of the trunk, tortuous shape of the trunk, the increase of the branch, and the involvement of the pulmonary artery circulation in the partial lesion. In this study we found 98 branches of bronchial artery, out of which 72 branches of bleeding, including 60 bronchial arteries and 12 pulmonary arteries. As shown in fig 1 and table 1.

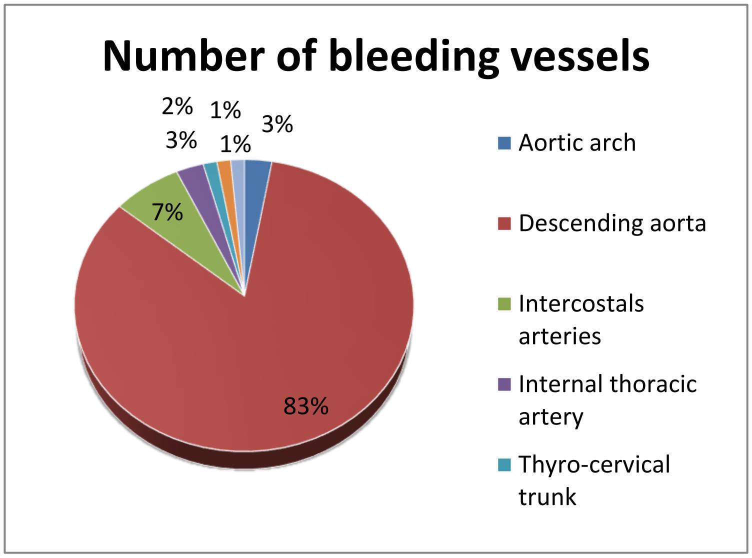
Comparison of BA- CTA with DSA

The CTA and DSA results of 28 patients with haemoptysis were compared with the preoperative CTA group. 2 bronchial were not found by CTA. The false negative rate was 4.2% (2/48), and 1 other bronchial artery found by CTA was not found in DSA. The false positive rate was 2.1% (1/47). The DSA is use as the gold standard. By using the X^2 test, the sensitivity of the BA-CTA is 97.9% and the specifity is 100%, (p< 0.05), as shown in figure 2 and table 2.

Table 1. The manifestation of the vessels in 46 patients with haemoptysis

Origin	Vessels Responsible for bleeding	
	Number of bleeding vessels	%
Aortic arch	2	2.8
Descending aorta	60	83.3
Intercostals arteries	5	6.9
Internal thoracic artery	2	2.8
Thyro-cervical trunk	1	1.4
Axillaries artery	1	1.4
Sub diaphragmatic artery	1	1

Total	72	100



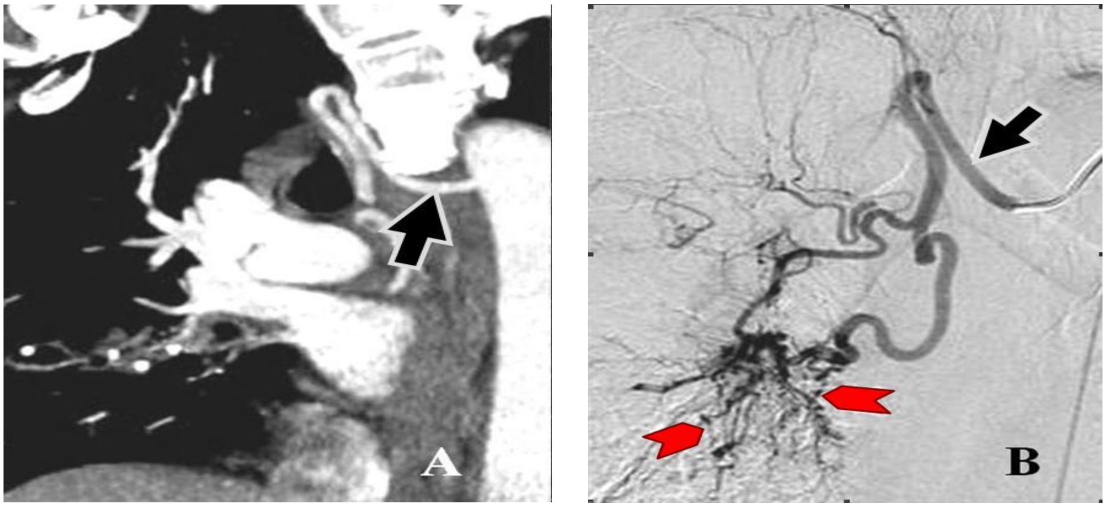


Figure 1. A and B are respectively CTA and DSA, right bronchial artery (Shown in black arrow), visible right bronchial artery dilated and tortuous, distal branches. DSA showed abnormal staining (red arrow

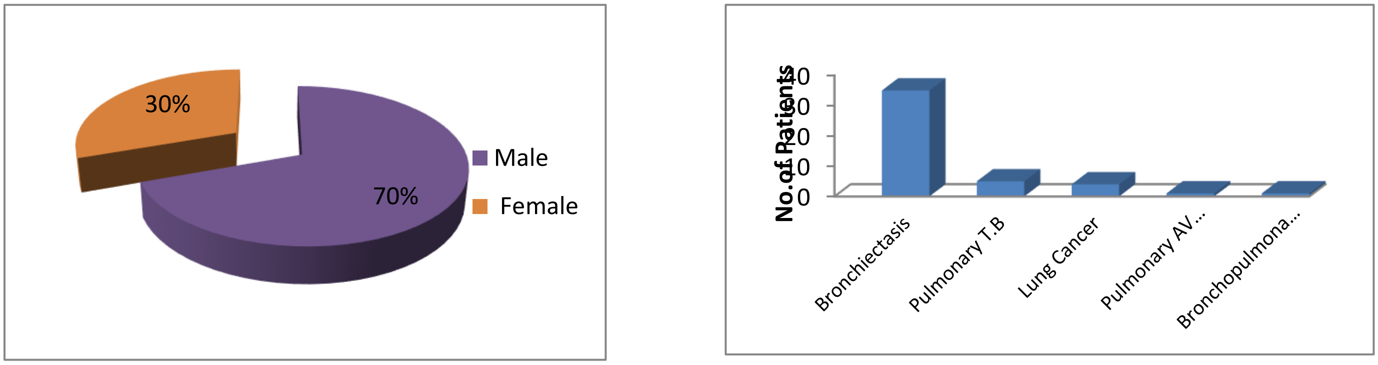


Figure 2 A and B: Male female ratio and causes of Haemoptysis

CTA	DSA
28	18

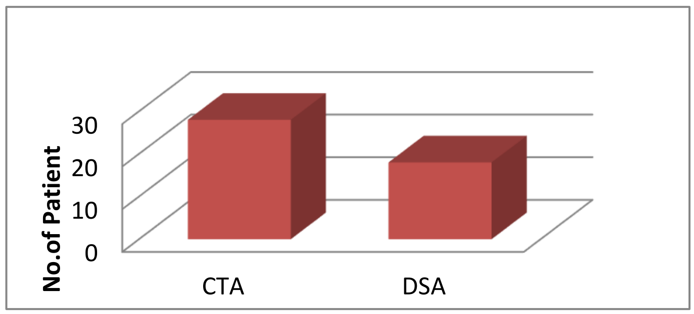


Figure 3. A and B Demographic Distribution of CTA and DSA Group

Comparison of BA- CTA with DSA

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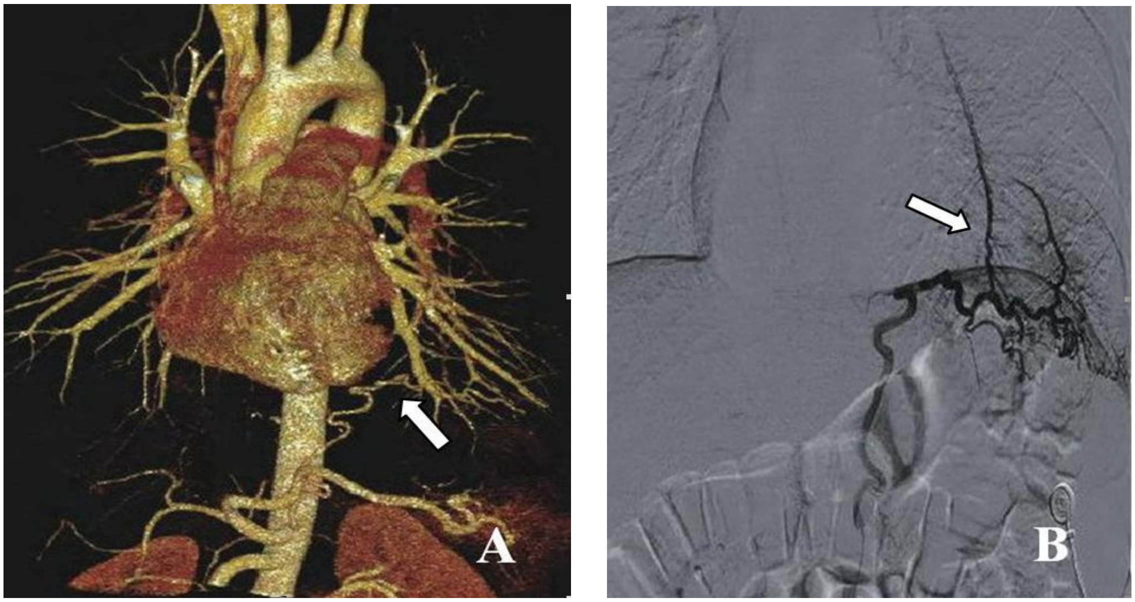

Figure 4. A and B. Right bronchial arteries, CTA 3D reconstruction (VR) and DSA (Shown in small white arrow), showing the left phrenic artery dilated and tortuous, participate in the blood supply of the left lower lobe of the lung

Table 2. The Comparison of BA-CTA and DSA result

	DSA(+)	DSA(-)
BA-CTA(+)	46	1
BA-CTA(-)	2	0

Interventional Treatment of Hemoptysis

All the 46 patients were treated with interventional treatment, and compared with the simple DSA group. In preoperative CTA group, the artery responsible for bleeding were easily chosen, during BAE, and DSA showed the origin, branching pattern, and distribution of responsible artery were similar to those with the preoperative CTA. The success rate was 100%. SEE figure 3. The relative parameters of the two groups during interventional procedure are shown in table 3.

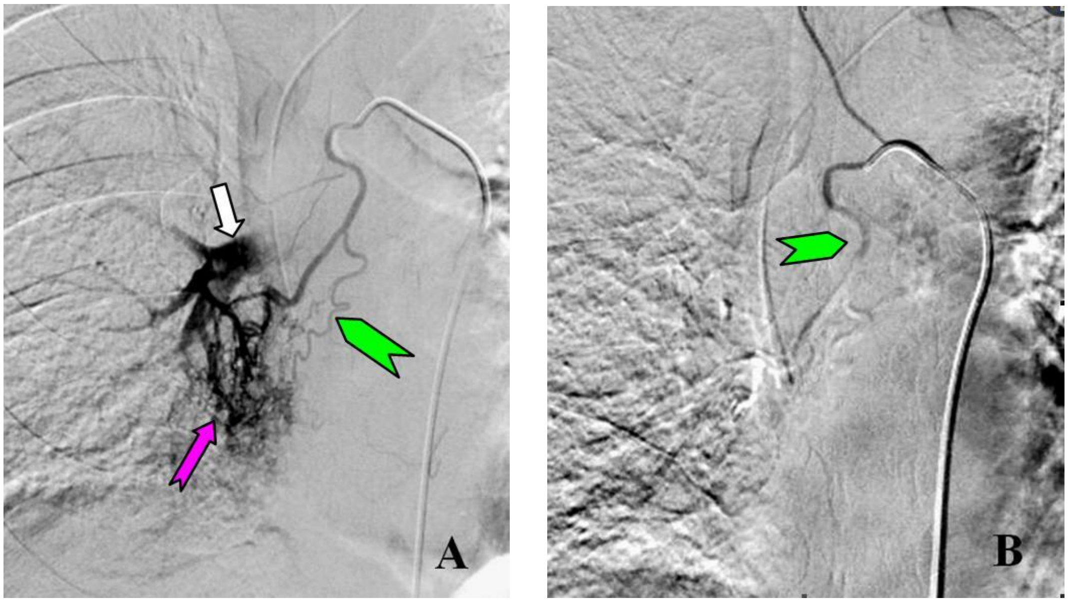

Figure 5. Shows Right bronchial artery DSA (Shown in green line head), we can see the thickening of the right bronchial artery, tortuous and abnormal course with the right pulmonary artery (Pink arrow), B: right DSA after remobilization of bronchial artery (shown in Green arrow), distal branch occlusion and undeveloped abnormal course with pulmonary artery disappeared.

Table 3. Comparison of surgical parameters between Preoperative CTA and simple DSA

Group	n	Total fluoroscopy time （min）	Total operative time （min）	Contrast dose （ml）
Patients with CTA group	28	8.42±2.82	28.34±5.61	27.86±6.42
Patients with DSA group	18	18.46±10.34	40.27±16.32	62.59±19.48
t	-	4.38746	3.32694	13.8057
p	-	＜0.05	＜0.05	＜0.05

Discussion

The treatment of haemoptysis mainly consists of medical, surgical intervention and interventional treatment. In the medical treatment mainly consists of haemostatic drug and symptomatic supportive treatment, but the effect of treatment in unstable. The advantage of surgical resection is the removal of diseased tissue from the root, but the surgical trauma, on the other hand. In some patients we cannot judge the bleeding site to take surgery, causing difficulty in treatment, delay the rescue time [22]. Because of most of the haemoptysis is caused by bronchial artery damage. Bronchial artery embolization has become an important means for the treatment of haemoptysis is because of its rapid homeostasis, minimally invasive and repeatable operation. Bronchial artery embolization is ideal, minimally invasive technique in the management of massive and recurrent haemoptysis [23]. Haemoptysis can be life threatening emergency and need urgent investigation. In these patients causes, source and location of haemoptysis before BAE procedure is more meaningful and can direct a more focused and potent procedure. Patients with haemoptysis are evaluated initially by radiography, bronchoscopy, and CT of the chest. Primarily to detect the site of bleeding and the underlying cause [17]. CT scan can distinguish and trace the bronchial artery and to forecast the presence of non bronchial systemic vessels that supply the parenchymal lesion. That's why displaying the bronchial arteries (BAS) with the CT before performing bronchial artery embolization interventional procedure could provide useful information and can direct for bronchial arterial interventional procedure. In our study, we have made to assay the significance of CTA for diagnosis and management planning in patients with haemoptysis. CTA is useful method to detect bronchial and non bronchial arteries [6, 7, 24, 25]. So,it is very useful to the interventional radiologist for planning BAE [16, 17, 24, 25]. MDCT has the advantage that it not only can find out but also accurately describe the origin and pathway of bronchial arteries. Management depends on the basis of identification of cause of haemoptysis. In our study, out of 46 patients of haemoptysis we found 35 cases of bronchiectasis, 5 cases of pulmonary tuberculosis, and 4 cases of lung cancer. Above results are aligned with that of Antoine Khalil et al. [26] he found that out of 200 CTA group patients of haemoptysis he found those 50 cases of bronchiectasis, and 23 cases of active tuberculosis.

Bronchial arteries are the major source of bleeding. It supplies blood to the airways of lung, lymph nodes and esophagus. Bronchial arteries show quite variations in their course, origin and branching pattern [2]. Most commonly bronchial arteries originated from the descending aorta at the level of T5-T6 vertebral bodies and are named as orthotopic bronchial arteries. Most evident vessel is the right intercostals trunk(88.7%).The anomalous or ectopic bronchial arteries (more than 30%) arises from the thoracic aortic branches or, outside the T5-T6 vertebral bodies [17, 25]. Orthotropic and ectopic bronchial arteries enter the lung parenchyma through the hilum and pathway parallel to the main bronchi and their division [5, 2 1, 25]. Dot or lines of increased attenuation is distinguished as bronchial artery at the posterior mediastinum. On the CT scans bronchial arteries which are larger than 2 mm in diameter are advised to be not normal and are candidates for bronchial artery embolization. A normal-sized bronchial artery too leads to bleeding [5-7, 27]. Our study showed bronchial arteries that originated from the descending aorta 60(83.3%) at the level of T5-T6 vertebral body were considered orthotopic. These results are in agreement with those of Despina savvidou et al. who found 86% of the bronchial arteries depicted by CTA were orthotopic [28]. Other study done by Mudit Gupta, found that 25 (92.6%) were orthotopic [21]. Another study done by Sherif A.A. Mohammed also found 82/92 (89%) of the bronchial arteries were orthotopic [29]. Another study done by Abdel-Ghany and collageagues also found that 90% of the bronchial arteries seen were orthotopic [30]. In our study, 5(6.9%) bronchial arteries were originated indirectly from the intercostals arteries (which are derived from the descending thoracic aorta), only few arteries 2(2.8%) originated from the arch of aorta, 2 (2.8%) bronchial arteries were originated from internal thoracic artery, 1(1.4%) bronchial artery from thyrocervical trunk, 1(1.4%) bronchial artery from axillary artery, and another 1(1.4%) bronchial artery from inferior phrenic artery. Our study is in agreement with Abdel-Ghany and colleagues found 10% of ectopic bronchial arteries (seen in 7 patients) [30]. Another study done by Gupta et al also found ectopic origin in 7.4% [21].

As we know that, DSA is gold standard in the management of massive haemoptysis patients. It can be used as diagnostic as well as, therapeutic tool. But now days, as a diagnostic tool it is very rarely used. In advancement in CT technology MDCTA provides all the necessary information for diagnosis, and, hence the invasive procedure could be avoided for diagnostic purpose. Primary descending aortogram was done for above patients. Origin and number of bronchial arteries from the aorta helps determine the optimal angiographic approach. Both DSA and CTA showed abnormal bronchial artery in all potential cases. In our study, out of 46 bronchial arteries responsible for haemoptysis 2 were not found by CTA and found by DSA during procedure. Beside, 1 bronchial artery responsible for bleeding not observed in flush AP aortogram was selectively catheterized and embolized with the help of CTA finding. Therefore localization of artery was not necessary by oblique flush aortograms. Mudit Gupta et al. [21] studied showed 4 of 25 abnormal bronchial arteries (16%) were not seen in flush anteroposterior aortogram too. In our study we also cannot find one BA. But, our study CTA was able to demonstrate all abnormal bronchial arteries. So, CTA is suitable replacement for routine use of preliminary flush aortography before BAE for identifying the number and site of abnormal arteries. Remy et al. [6] advised that, thoracic aortography (invasive procedure), should be replaced with CTA to improve detection of bleeding arteries.

It is well know that the application of CTA observation of bronchial arteries before interventional procedure , it can predict the origin, course especially ectopic origin and deformity of the bronchial arteries path have full understanding and accurate positioning, as well as non bronchial arteries, and time saving during procedure. Exploration of all non-bronchial systemic arteries to find abnormal artery followed by selective catheterization and embolization is a hard job and take a long duration and applied in critical condition especially in life threatening situations. In our study, 28 patients, in the simple DSA group, intraoperative time were (40.27±16.32) min, and preoperative CTA group of 18 patients were (28.34±5.61) min, showed that the preoperative CTA examination of patients were shorter operation time than simple interventional treatment of DSA patients. In simple DSA group, total fluoroscopy time was 18±46 and in preoperative CTA was 8.42±2.82, and total contrast dose in DSA group was 62.59±19.48and in preoperative had lower 27.86±6.42.CTA examination before operation can shorten operation time , reduce the radiation time of patients and medical personnel. In our knowledge, very few articles about measurement of radiation dose, fluoroscopy time during the interventional procedure and intraoperative time. A study done by Da Binbin and his collegeagues in first affiliated hospital of Kunming medical university, Yunnan, China, found that In group of 34 patients, DSA group intraoperative X-ray time was (40.55±10.01) min, And in preoperative CTA group (28.33±7.68)min, showed that in preoperative CTA examination of patients with operation time shorter than simple interventional treatment of DSA patients [31]. The study is in agreement with our study.

There were some limitations of this study. First our study is prospective. Hemodynamically unstable patients were not offered MDCTA before embolization to ensure patients safety in our study criteria. Secondly, we do not preoperative CTA group. We can recommend MDCTA before interventional procedure in all patients of haemoptysis.

Conclusion

CTA examination before operation were failed to show all the lesions of arteries, but its high detection rate sufficient to meet the needs of clinical work. The application of CTA evaluation of the bleeding artery before operation, can find the bleeding artery to provide accurate positioning of the interventional physician helps the preoperative diagnosis of the causes of bleeding and the interventional procedures according to the search for bleeding artery BAE, reduce the risk of leakage and recurrence of haemoptysis suppository. Preoperative CTA examination can also shorten the time of interventional operation and reduce the radiation dose of medical staff and patients. In conclusion, preoperative CTA can be used as routine preoperative examination for interventional treatment of haemoptysis. It can provide good preoperative guidance for interventional treatment of haemoptysis, and has extensive clinical value.

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