The Value of Aquilion One 320 CT Volume Scanning Branches of Blood Vessel Imaging in Massive Hemoptysis Patients before Interventional Embolization

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Abstract

Objective: To investigate the value of Aquilion One 320 CT volume scanning branches of blood vessel imaging in Massive Hemoptysis patients before interventional embolization. Methods: Choosing 90 patients who were involved in the treatment of interventional embolism in June 2017 to June 2017, in the case of patient voluntarily participation in this study, in accordance with the surge in Aquilion One 320 volume scanning branches, the blood vessel imaging is divided into The observation group (N = 45, Aquilion One 320 volume scanning branches before surgery), the control group (N = 45, no Aquilion One 320 volume scanning before surgery), compared the two sets of image expressions and surgery. Results: the observation group DSA examination showed 73 related responsibility blood vessels, including 58 bronchial arteries, 15 circulating arteries of the lungs, and CTA examination showed 68 associated responsibility blood vessels, including 55 bronchial arteries, 13 circulating arteries of the lungs. The detection rate is 93.1%, 94.8%, 86.7%, with higher detection rate; observation group perspective time 18.6 ± 2.4min, 31.3 ± 6.7 min, the number of catheters is 1.5 ± 0.4, and the control group perspective time 25.1 ± 3.5 min, surgical time 43.2 ± 7.8 min, the catheter is 2.1 ± 0.3, and the observation group is lower than the control group.

Keywords

Bronchial Artery Imaging, Massive Hemoptysis, BAE

Hemoptysis refers to bleeding in the trachea, bronchi and lung parenchyma, and blood spits out of the mouth through coughing. When the single hemoptysis volume exceeds 300ml or the daily hemoptysis volume reaches more than 500ml-2000 ml, it will be severe hemoptysis. Massive hemoptysis is a common clinical respiratory emergency with high mortality. Most studies have confirmed that bronchial artery circulation is the main source of acute massive hemoptysis. Bronchial artery embolization is considered as a first-line treatment for controlling bleeding, and it is also an important auxiliary means for surgical treatment [1]. But big haemoptysis lesions in patients with vascular contorts, origin and number of each are not identical, often brings great difficulties to BAE, so how to quickly find accurate is importent. Therefore, this study collected in our hospital BAE treatment of 90 patients with haemoptysis, according to whether 320 row CT volume scanning bronchial vascular imaging is divided into observation group and control group, 320 row CT volume scanning bronchial imaging in big hemoptysis patients BAE therapy application value, presently reports as follows.
1. Object and method

1.1 Research Object

Collected in our hospital in June 2017 to June 2020 big haemoptysis parallel interventional embolization treatment of 90 cases of patients, divided into observation group and control group, the research object to sign check informed consent, by ethics committees related requirements. Inclusion criteria: (1) Conservative treatment the effect not beautiful big hemoptysis patients; (2) Patients with interventional embolization, the CTA examination adopts 320 row CT scanning combined with prospective heart switch control of 16 cm volume manner; (3) All have complete clinical data, the patients or their family members signed the informed consent and voluntary related checks and treatment. Exclusion criteria: (1) Patients with allergic to iodine contrast agent; (2) Blood coagulation dysfunction patients; (3) Hemodynamic instability or cardiopulmonary function of liver and kidney disorders.

1.2 CTA inspection method

Toshiba Aquilion One 320-row CT was used to scan the volume of 8cm above and below the trachea carina. Prospective ECG gating technology was used. The scanning parameters were 80-120KV, 200-300mA, 0.5mm in thickness, 0.5mm in interval, 0.35s in rotation speed and 320 layers X0.5mm in volume scanning. The Sure - Start software automatic trigger mode, threshold is set to 180 hu, choose according to manufacturer recommendation collection cardiac cycle number and when, heart rate < 66 times/min picked up from the one cardiac cycle, the heart rate of 66-80 times/min by 2 times the heart cycle collection, heart rate > 80 times, can manually add scan cycle for some patients, trigger phase is 30%-80% of R - R interphase; Contrast agent (iodixanol 320mg/L/mL, 60mL, 6.0mL/s) and normal saline (30mL, 6.0mL/s) were injected through the right elbow vein with a double-cylinder high-pressure syringe (Ulrich, Germany).

1.2.1 Image reconstruction and post-processing

Transmit the data to Vitrea Core post-processing workstation, select the best R-R phase reconstruction image, first observe the image through the cross section, and then use curved planar reconstruction (CPR), maximum intensity projection (maximum intensity projection—MIP), Multiplaner Reconstruction (MPR) technology, combined with Volume Rendering (VR) and image fusion technology, were analyzed and diagnosed by two senior radiation attending doctors respectively.

1.3 DSA embolization method

GE Medical Systems Innova 3100-IQ, using the Seldinger technique, under the continuous ecg monitoring and oxygen, regular disinfection, through the right femoral artery puncture intubation after local anesthesia, T4 in the thoracic aorta with 5 f pigtail catheter angiography, in bronchial artery or other related arteries in a suitable catheter (such as SIM). Found that the responsibility after vascular embolization, postoperative close observation of patients condition and follow-up.

1.4 observe

(1) Comparative observation group of CTA and DSA artery detected liability (2) Interventional embolization of the two groups (perspective. Number of catheter use. Operation time, etc.)

1.5 Statistical methods

Apply SPSS24.0 statistical software for data analysis, the continuous variable data using t test, expressed with mean + / - standard deviation, classification of variable data chi-square test, with that number and percentage, p value is less than 0.05 is considered there is statistical significance.

2. Results

2.1 Two groups of general information

Two groups of age, gender and other distribution differences had no statistical significance (P > 0.05), comparable,
see Table 1.

Table 1. Two groups of general information

<table>
<thead>
<tr>
<th>gender</th>
<th>The average age</th>
<th>type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>bronchiectasis</td>
</tr>
<tr>
<td>male</td>
<td>female</td>
<td>21</td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>46.43±13.21</td>
</tr>
<tr>
<td>Observation group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>female</td>
<td>19</td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>44.82±14.43</td>
</tr>
<tr>
<td>The control group</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Observation group situation. Observation group 45 cases with DSA examination showed the blood vessels are a total of 73 cigarettes, responsible to the bronchial artery 58, extracorporeal circulation pulmonary arteries 15, CTA examination showed the blood vessels are a total of 68 cigarettes, responsible to 55 of bronchial artery, pulmonary artery 13 after cardiopulmonary bypass, both has the high efficiency of detection, see Table 2.

Table 2. Observation group of CTA and DSA haemoptysis responsibility vessel detection

<table>
<thead>
<tr>
<th>method</th>
<th>Bronchial artery</th>
<th>Extracorporeal circulation artery</th>
<th>combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSA</td>
<td>58</td>
<td>15</td>
<td>73</td>
</tr>
<tr>
<td>CTA</td>
<td>55</td>
<td>13</td>
<td>68</td>
</tr>
<tr>
<td>Detection rate</td>
<td>94.8</td>
<td>86.7</td>
<td>93.1</td>
</tr>
</tbody>
</table>
Male, 54, rich blood supply of lung cancer, haemoptysis more than half month, the medication the effect not beautiful, using 320 row CT vascular volume scanning, display abnormal enlargement of bronchial artery supply of blood (Figures 1-3); According to the CTA, intraoperative rapid intervention hook the responsibility vascular confirmed bronchial artery obvious enlargement circuity, embolization with PVA - 500 particles (Figures 4-6).

(2) Into the history of tuberculosis patients compared 90 patients, has a history of tuberculosis (TB) 32 cases, 23 cases of men, haemoptysis responsibility vessels with an average of 3.15 ± 1.68, no history of tuberculosis (TB) 58 cases, 27 cases for men, haemoptysis responsibility vessels with an average of 2.24 ± 1.47, p<0.05, The difference is statistically significant.

2.2 Compare two groups of operation situation

Observation group compared with control group and observation group in the total time of operation, the perspective of time and the use of catheter number, and so on and so forth are better than the control group, and (P < 0.05). The difference is statistically significant, see Table 3.

<table>
<thead>
<tr>
<th>Group</th>
<th>Perspective time (min)</th>
<th>Operation time (min)</th>
<th>Dosage catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>18.6 ± 2.4</td>
<td>31.3 ± 6.7</td>
<td>1.5 ± 0.4</td>
</tr>
<tr>
<td>The Control</td>
<td>25.1 ± 3.5</td>
<td>43.2 ± 7.8</td>
<td>2.1 ± 0.3</td>
</tr>
<tr>
<td>p</td>
<td>0.023</td>
<td>0.010</td>
<td>0.009</td>
</tr>
</tbody>
</table>

3. Discussion

Lung has two vascular system, pulmonary and bronchial circulation, bronchial system provides 1% of the blood supply, and blood oxygen under high pressure. Ninety percent of patients with hemoptysis and pathological changes of bronchial arterial system, Bronchial artery directly on the T5 vertebral endplate and T6 vertebral endplate under the proximal thoracic descending aorta between any other origin place called ectopic origin [2]. Because the bronchial circulation is the main source of big hemoptysis bleeding, BAE therefore is considered to be the preferred treatment method, and is also an important way to control bleeding. In addition, for the drug therapy or surgery contraindications to chronic recurrent hemoptysis patients, it is also an effective treatment method [3, 4]. In patients with hemoptysis, before interventional therapy with a to determine the source of bleeding and the reason is very important, CT angiography including the aorta and pulmonary artery, besides can show the fine details of the aorta and pulmonary artery, can the arcuate vessels and other branches of the aorta, information than ultrasonic or plain radiographs. So far, there have been many studies reported before embolization of CT angiography in the diagnosis of abnormal arteries and cause hemoptysis plays a key role [5-8]. Big hemoptysis pa
patients with onset nasty, illness weight, intraoperative blood possible choking, suffocation, such as risk, requires that the performer to find responsibility artery for processing as soon as possible. 320 row dynamic volume CT scanning mode, can realize the most organs without moving moment of imaging technology, in full organ full information, avoid the horizontal spiral scanning by mobile data error, also greatly reduce scanning dose. In addition, using the switch control acquisition and high-speed mass injection of contrast (6.0 mL/s), which significantly reduce the motion artifact and led to the rapid filling of small blood vessels [9, 10]

Results of this study show that DSA imaging as the gold standard, Observation group of patients with hemoptysis responsible blood vessels, 73, 58 bronchial artery, pulmonary artery 15 after cardiopulmonary bypass. The detection rates of 30-slice CT volumetric scanning were 94.8% and 86.7% respectively. And 320 row CT volume scanning imaging showed pathological changes of bronchial artery lesions, distal branches contorts the distribution, and so on and so forth; Compared the two groups, observation group perspective of time, operation time, catheter use quantity are lower than the control group, Instructions before interventional embolization for 320 volume CT scan imaging, patients can effectively reduce the operation time, save the operation cost, reduce the radiation dose, etc.

This study also found that the larger history of hemoptysis tuberculosis patients had higher percentage, Consistent with the literature [11], and any history of tuberculosis (TB) big haemoptysis responsibility vascular contrast p < 0.05, statistical differences, therefore has a history of tuberculosis hemoptysis patients whether can check the CTA as a basic for further study.

Above all 320 row CT volume scanning CTA can accurately identify the origin of bronchial artery, common variants, provide accurate for cardiologists. Provide accurate roadmap for cardiologists, reduce the search time in angiography. Thus, make angiography contrast medium load, the perspective of exposure dose and often unstable patients in time to minimize the cost of angiography.

References