

## •肿瘤介入 Tumor intervention•

## 骶骨肿瘤血供特点及栓塞后术中出血的分析

徐家华, 顾小强, 钱建新, 于观贞, 武清

**【摘要】 目的** 探讨骶骨肿瘤供血特点以及术前腰动脉栓塞在骶骨肿瘤切除术中止血的应用价值。**方法** 纳入 42 例骶骨肿瘤患者,包括脊索瘤 14 例、神经鞘瘤 8 例、转移瘤 7 例、骨巨细胞瘤 5 例和其他肿瘤 8 例。采用血管造影观察骶骨肿瘤供血情况,对腰动脉供血的骶骨肿瘤用明胶海绵超选择性动脉栓塞,栓塞后 24 h 内行手术切除。**结果** 42 例肿瘤中有 14 例(33.3%)存在腰动脉供血,腰动脉供血与骶骨肿瘤大小相关( $P=0.023$ )。对 14 例患者的 20 支腰动脉供血支(右腰 2 动脉 1 支,左腰 3 动脉 1 支,右腰 3 动脉 3 支,左腰 4 动脉 6 支,右腰 4 动脉 8 支,左腰 5 动脉 1 支)栓塞后,术中出血量为 200~5 000 mL,中位出血量 1 550 mL。**结论** 术前超选择性腰动脉栓塞能有效地减少术中出血,降低手术危险性,提高肿瘤手术切除率,是十分有效的方法,可推广为临床术前操作标准模式。

**【关键词】** 骶骨; 肿瘤; 栓塞; 明胶海绵; 腰动脉

中图分类号:R73.3 文献标志码:A 文章编号:1008-794X(2019)-012-1148-03

**Blood supply characteristics of sacral tumors and analysis of intraoperative hemorrhage after embolization** XU Jiahua, GU Xiaoqiang, QIAN Jianxing, YU Guanzheng, WU Qing. Department of Oncology, Affiliated Longhua Hospital, Shanghai University of Traditional Chinese Medicine, Shanghai 200032, China

Corresponding author: YU Guanzheng, E-mail: qiaoshanqian@aliyun.com

**【Abstract】 Objective** To investigate the blood supply characteristics of sacral tumors and to discuss the hemostatic value of preoperative lumbar artery embolization in sacral tumor resection. **Methods** A total of 42 patients with sacral tumors, including chordoma( $n=14$ ), chondroma( $n=8$ ), metastasis( $n=7$ ), giant cell tumor of bone( $n=5$ ) and other tumors( $n=8$ ), were enrolled in this study. Angiography was performed to display the blood supply of sacral tumors. For sacral tumors receiving blood from the lumbar artery, superselective arterial embolization with gelatin sponge was performed, which was followed by surgical resection within 24 hours. **Results** Of 42 tumors, lumbar artery blood supply was found in 14(33.3%), and a significant correlation existed between the presence of lumbar arterial blood supply and the size of sacral tumor( $P=0.023$ ). Embolization of 20 lumbar artery branches supplying blood to sacral tumor was carried out, including right L2 artery( $n=1$ ), left L3 artery( $n=1$ ), right L3 artery( $n=3$ ); left L4 artery( $n=6$ ), right L4 artery( $n=8$ ), and left L5 artery( $n=1$ ). In subsequent surgery, the intraoperative blood loss was 200-5 000 mL, with a median blood loss of 1 550 mL. **Conclusion** In surgically treating sacral tumors, preoperative superselective lumbar artery embolization can effectively reduce intraoperative blood loss, reduce the risk of surgery and improve the surgical resection rate of tumor. Therefore, preoperative superselective lumbar artery embolization is a very effective method, and it should be popularized in clinical practice and used as the standard procedure of preoperative preparation. (J Intervent Radiol, 2019, 28: 1148-1150)

**【Key words】** sacrum; tumor; embolization; gelatin sponge; lumbar artery

骨盆是骨肿瘤的好发部位之一,占原发性骨肿瘤 10%~15%<sup>[1]</sup>。外科手术治疗仍然是目前骨盆肿瘤的主要治疗手段。单纯外科直接切除术是在术中结扎髂内动脉或暂时阻断腹主动脉,以减少术中出血,并发症多<sup>[2-3]</sup>。1975 年, Feldman 等<sup>[4]</sup>首次报道了在骨肿瘤手术切除前,经导管动脉栓塞治疗取得了满意效果。此后,骨肿瘤的术前栓塞受到外科医师的重视,许多学者做了大量研究<sup>[5]</sup>,但目前仍然没有统一的栓塞规范。

## 1 材料与方法

### 1.1 材料

1.1.1 临床资料 本组 42 例骶骨肿瘤病例中,男 20 例,女 22 例,年龄 22~70 岁,中位年龄 47 岁,造影明确腰动脉直接参与肿瘤供血病例 14 例。全部病例均经临床 CT 和/或 MR 检查,并经手术病理证实。病理组织学类型:脊索瘤 14 例,神经鞘瘤 8 例,转移瘤 7 例,骨肉瘤 1 例,骨软骨肉瘤 3 例,骨巨细胞瘤 5 例,血管母细胞瘤 1 例,多发性骨髓瘤 1 例,血管肉瘤 1 例,成软骨细胞瘤 1 例。

1.1.2 器材与设备 导管多选用 5 F Pigtail、5 F Cobra、5 F RUC、2.7 F Progreate,导丝以 0.035 英寸超滑导丝为主。设备为 Siemens Artis Zee Floor DSA。300 mg I/mL 欧乃派克对比剂。

### 1.2 方法

1.2.1 造影方法 常规 Seldinger 技术穿刺右股动脉,5 F 猪尾导管行腰 3 水平腹主动脉造影,以 15 mL/s, 30 mL 总量,350 psi 高压注入对比剂,以 3 幅/s 摄片,连续摄片 20 s。5 F Cobra 导管行腰动脉造影,以 4 mL/s,12 mL 总量,250 psi 高压注入对比剂,以 3 幅/s 摄片,连续摄片 20 s。肿瘤主要供血动脉造影,评估肿瘤供血动脉及动脉间有无交通。如 Cobra 管造影时有对比剂反流,可经 5 F Cobra 导管以 2.7 F

Progreate 超选后,再行栓塞。

1.2.2 栓塞治疗 根据造影情况,超选插管至 5 F Cobra 导管超选至直接参与肿瘤供血腰动脉,再次手推注入对比剂造影检查并测压后,全程透视下推注粒径 560~710  $\mu\text{m}$  明胶海绵颗粒栓塞肿瘤供血动脉直至该肿瘤供血动脉的血管铸型;对较小的肿瘤供血动脉,以 2.7 F Progreate 超选后用粒径 560~710  $\mu\text{m}$  明胶海绵颗粒栓塞至血管铸型。

### 1.3 统计分析

测得数据用 SPSS21.0 统计软件作统计分析,组间数据采用卡方检验,两两比较采用 Spearman 相关性检验。

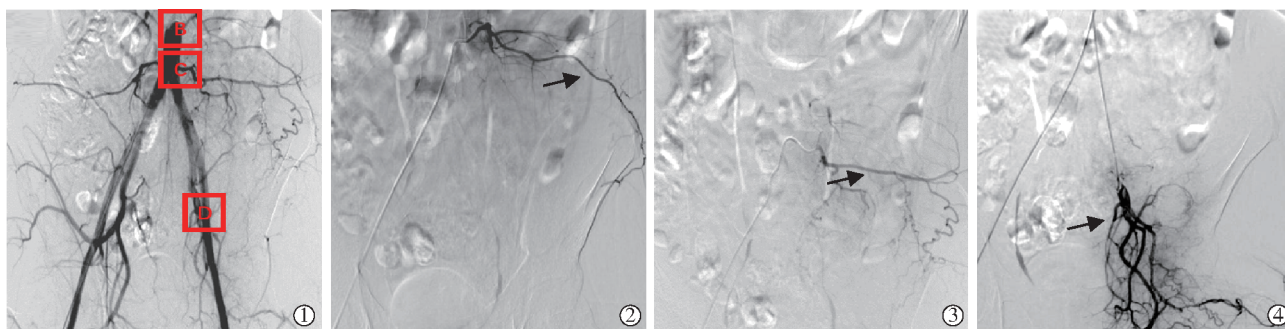
## 2 结果

### 2.1 腰动脉与肿瘤血供关系

42 例骶骨肿瘤中 14 例(33.3%)存在腰动脉供血(图 1)。14 例中有 20 支血供可以直接栓塞,包括右腰 2 动脉 1 支、左腰 3 动脉 1 支、右腰 3 动脉 3 支、左腰 4 动脉 6 支、右腰 4 动脉 8 支和左腰 5 动脉 1 支。腰动脉是否直接参与肿瘤血供与骶骨肿瘤直径有关,腰动脉直接参与肿瘤供血瘤体长径 3.9~11.0(6.2 $\pm$ 2.0) cm,而腰动脉未参加供血瘤体直径为 3.0~12.6(7.9 $\pm$ 3.3) cm。腰动脉是否直接参与肿瘤血供与骶骨肿瘤大小(长径)相关。

### 2.2 手术出血情况比较

所有患者肿瘤均得到完全切除。外科切除手术均在介入治疗后 24 h 内进行。本组病例栓塞患者术中出血量 200~5 000 mL,中位出血量 1 550 mL,平均 1 185 mL;未栓塞患者的出血量为 200~12 000 mL,中位出血量 3 000 mL。腰动脉参与骶骨肿瘤血供。患者经腰动脉栓塞后出血量显著减少,差异有统计学意义( $P<0.05$ )。经栓塞后,术中出血量小。



①腹主动脉造影显示左腰 3、左腰 4 动脉、左髂内动脉增粗、迂曲,分支增多;②左腰 3 动脉(箭头)显影情况,分支与左髂内动脉分支交通;③左腰 4 动脉(箭头)显影情况;④左髂内动脉(箭头)显影情况,分支与左腰 3 动脉分支交通。

图 1 骶骨肿瘤腹主动脉造影示意图

### 3 讨论

正常解剖骶骨的动脉供应主要来自盆腔壁支动脉,其分支在骶骨前后面、骶管腹背侧面相互吻合,形成丰富的动脉网,动脉网发出多发分支参与骶骨血供<sup>[6-7]</sup>。因骶骨及其周围的血供异常丰富常导致手术过程中出血量大,引起较多的术后并发症<sup>[8-9]</sup>,控制骶骨肿瘤手术出血是目前临床一大难题。

骶骨局部区域动脉血管丰富并相互吻合,其参与构成大骨盆动脉环、小骨盆动脉环,并与盆腔脏器供血动脉环吻合。骶骨区域动脉吻合网主要包括骶前动脉吻合网、骶后动脉吻合网及骶管动脉吻合网。三者之间主要通过骶外侧动脉背侧支在骶骨内部前后交通。骶前动脉网主要由骶正中动脉与骶外侧动脉的上下分支吻合,骶正中动脉向下行走至尾骨表面与盆腔脏器动脉环相吻合,髂腰动脉脊支及第4腰动脉(亦有称之为最下腰动脉)腹侧支也参与骶前动脉网吻合<sup>[10-12]</sup>。术前髂内动脉栓塞及术中腹主动脉球囊阻断和术中髂内动脉结扎等方法被用来减少术中出血,但均无法有效减少术中出血量。本研究认为,单纯阻断主干血供,而不对交通动脉支有效栓塞,是无法有效减少术中出血量的<sup>[4-6]</sup>。

髂外动脉分支之旋髂深动脉与第4腰动脉与髂内动脉分支之髂腰动脉及闭孔动脉于髂窝处吻合成网,该吻合为髂内、髂外动脉之间的主要吻合。腰动脉直接参与构成骶骨的局部区域动脉网的构成,并参与了髂内、髂外动脉分支间的吻合。本研究发现,栓塞直接参与肿瘤供血之腰动脉,明显减少术中出血量;认为骶骨肿瘤术前栓塞直接参与骶骨肿瘤血供之腰动脉,能有效阻断骶骨肿瘤血供<sup>[13-15]</sup>。如腰4动脉无明显直接参与骶骨肿瘤直接血供,亦予以栓塞,以减少骶骨间接供血动脉间交通,目前国内并无骶骨肿瘤术前腰4动脉栓塞的报道及可参考指南<sup>[12]</sup>。

### [参考文献]

- [1] Ozgiray E, Perumal K, Cinar C, et al. Management of calvarial tumors: a retrospective analysis and literature review[J]. Turk Neurosurg, 2016, 26: 690-698.
- [2] Wei Y, Lou J, Lou D. Comparison of efficacy between internal iliac artery and abdominal aorta balloon occlusions in pernicious placenta previa patients with placenta accrete[J]. Gynecol Obstet

Invest, 2019: 1-7.

- [3] 赵 玮, 王伟中, 陈 莹, 等. 骶骨肿瘤 27 例供血动脉的血管造影研究[J]. 介入放射学杂志, 2014, 23: 716-718.
- [4] Feldman F, Casarella WJ, Dick HM, et al. Selective intra-arterial embolization of bone tumors. A useful adjunct in the management of selected lesions[J]. Am J Roentgenol Radium Ther Nucl Med, 1975, 123: 130-139.
- [5] Reitz M, Mende KC, Cramer C, et al. Surgical treatment of spinal metastases from renal cell carcinoma - effects of preoperative embolization on intraoperative blood loss[J]. Neurosurg Rev, 2018, 40: 861-867.
- [6] Fander J, Buttner M, Kielstein H, et al. A missing posterior division of the internal iliac artery[J]. EJVES Short Rep, 2018, 40: 18-20.
- [7] Balaya V, Guimiot F, Uhl JF, et al. Three-dimensional modelization of the female human inferior hypogastric plexus: implications for nerve - sparing radical hysterectomy [J]. Gynecol Obstet Invest, 2019, 84: 196-203.
- [8] Widmann B, Galata C, Warschkow R, et al. Success and complication rates after sacral neuromodulation for fecal incontinence and constipation: a single - center follow - up study [J]. J Neurogastroenterol Motil, 2019, 25: 159-170.
- [9] Osei H, Munoz-Abraham AS, Bates KS, et al. Laparoscopic division of median sacral artery and dissection of types III and IV sacrococcygeal teratomas to decrease intraoperative hemorrhagic complications: case series and review of the literature [J]. J Laparoendosc Adv Surg Tech A, 2019, 29: 272-277.
- [10] Qiu YQ, Du MX, Yu BF, et al. Contralateral lumbar to sacral nerve rerouting for hemiplegic patients after stroke: a clinical pilot study[J]. World Neurosurg, 2019, 121: 12-18.
- [11] Fukuda T, Matsuda H, Tanaka H, et al. Selective inferior mesenteric artery embolization during endovascular abdominal aortic aneurysm repair to prevent type II endoleak[J]. Kobe J Med Sci, 2018, 63: E130-E135.
- [12] Domovitev SV, Chandhanayingyong C, Boland PJ, et al. Conservative surgery in the treatment of giant cell tumor of the sacrum: 35 years' experience[J]. J Neurosurg Spine, 2016, 24: 228-240.
- [13] Yu XC, Xu M, Xu SF, et al. Long - term outcome of giant cell tumor of bone involving sacroiliac joint treated with selective arterial embolization and curettage: a case report and literature review[J]. World J Surg Oncol, 2013, 11: 72.
- [14] Ghermandi R, Terzi S, Gasbarrini A, et al. Denosumab: non - surgical treatment option for selective arterial embolization resistant aneurysmal bone cyst of the spine and sacrum. Case report[J]. Eur Rev Med Pharmacol Sci, 2016, 20: 3692-3695.
- [15] 刘玉金, 徐家华, 武 清. 骶骨肿瘤术前供血动脉栓塞的临床应用[J]. 介入放射学杂志, 2018, 27: 464-467.

(收稿日期:2019-03-14)

(本文编辑:俞瑞纲)