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Original Article

To investigate the branching pattern of segmental branches of the splenic artery in human cadaveric spleens by dissection approach

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ABSTRACT:

Aim: The aim of this study to investigate the branching pattern of segmental branches of the splenic artery in human cadaveric spleens by dissection approach. **Material and methods:** The current investigation was done on 100 human cadaver spleens, regardless of age or gender, preserved in 10% formalin solution and obtained from the Anatomy department. The gross dissection was carried out in accordance with Cunningham's Manual. By cutting through the gastrosplenic and lienorenal ligaments, the spleen was discovered and liberated from the posterior abdominal wall and stomach. The splenic artery was severed around 10 cm proximal to the splenic hilum, and the spleen was removed. First, the principal segmental branches of the splenic artery were recognised and documented, and the distance between the splenic artery terminal and the splenic hilum was measured. The Digital Vernier Caliper was used to collect measurements. **Results:** Two primary segmental branches were seen in 69(69%) of the specimens, three main segmental branches in 25(25%) of the specimens, and four primary segmental branches in 6 (6%) of the specimens. The average distance between the splenic artery's terminus and the splenic hilum was 2.3 cm. The measurement range was 0.5 cm to 6.3 cm. **Conclusion:** Improved anatomical understanding of the splenic artery's segmental distribution and its changes is crucial for the partial removal of the spleen, and the current work contributes to that understanding.

Key words: Splenic artery, Segmental branches, Partial Splenectomy

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INTRODUCTION

Because of its high vascularity and fragility, the spleen is an organ that is often overlooked. The lymph nodes are the largest secondary lymphoid organ, containing 25% of the lymphoid tissue in the body and playing a role in both blood chemistry and immune defence. The splenic artery is the most prominent offshoot of the celiac trunk and is responsible for delivering blood and oxygen to the spleen. [1] It passes through the lienorenal ligament and reaches the vicinity of the splenic hilum, where it divides into two or three primary branches, each of which typically divides into two or four secondary branches. Additionally, the splenic trunk or one of its primary branches supplies the superior polar artery and the inferior polar artery, both of which supply the poles of the spleen without passing through the hilum. The two ends are known as the superior and inferior polar branches, respectively. Two or three distinct sections make up the human spleen. Every primary segment is further broken down into a few secondary ones that tend to be less stable. A distinct avascular plane divides the spleen into its individual segments. Because it is divided into segments by fibrous septa and each segment has its own main artery, splenectomy can be performed in stages.[2,3] Segmentation of the spleen may have resulted through the spleen's own development or from the terminal division of the artery supplying the organ. Gaining a deeper understanding of the segmental distribution of the splenic artery and its variations is crucial for its partial excision. Therefore, the present study was undertaken to examine the segmental branches of the splenic artery that divide the spleen into its various segments, its pattern of distribution, and to identify any inter-segmental arterial anastomosis by dissection technique, all with an eye toward the practical aspect and clinical significance of such an understanding.

METHODS AND MATERIALS

After receiving clearance from the protocol review committee and the institutional ethics committee, this prospective, randomised investigation was carried out in the Department of Anatomy. The current investigation was done on 100 human cadaver spleens, regardless of age or gender, preserved in 10% formalin solution and obtained from the Anatomy department. The gross dissection was carried out in accordance with Cunningham's Manual. By cutting through the gastrosplenic and lienorenal ligaments, the spleen was discovered and liberated from the posterior abdominal wall and stomach. The splenic artery was severed around 10 cm proximal to the splenic hilum, and the spleen was removed. The fascia and fat at the hilum were removed to reveal the segmental branches of the splenic artery. First, the principal segmental branches of the splenic artery were recognised and documented, and the distance between the splenic artery terminal and the splenic hilum was measured. The Digital Vernier Caliper was used to collect measurements.

RESULTS

Two primary segmental branches were seen in 69(69%) of the specimens, three main segmental branches in 25(25%) of the specimens, and four primary segmental branches in 6 (6%) of the specimens.

Table 1: Number of primary segmental branches of splenic artery

Primary segmental branches	Number of specimens=100	%
One	0	0
Two	69	69
Three	25	25
Four	6	6

The average distance between the splenic artery's terminus and the splenic hilum was 2.3 cm. The measurement range was 0.5 cm to 6.3 cm.

Table 2: Distance between the termination of splenic artery and the hilum of the spleen in cm.

Mean	2.3
SD	1.1
Min	0.5
Max	6.3
Median	1.7

DISCUSSION

The splenic artery supplies blood to the spleen and divides into two or three branches until it finally ends at the hilum. Primary branches may be divided into three categories: superior, intermediate, and inferior. There is an avascular plane separating the spleen into two regions that are each supplied by their respective branches. As a result, the spleen's vascular system is divided up into discrete sections by these branches. We might think of these arteries as the first stems from the segmental arteries. [4] Of the samples examined here, 72% had two major branches, 25% had three, and 6% had four. There were just a few main limbs, according to other research. The research so far has uncovered anything from two to four major limbs. Table 3 provides a comparison of the number of main branches to those of prior research.

Table 3: Comparison of number of primary segmental branches of splenic artery with the previous studies

Author	Number of specimens studied	Number of primary segmental branches		
		2	3	4
Gupta CD et al. (1976) [5]	50	84%	16%	-
Mikhail Y et al. (1979) [6]	25	77%	23%	-
Katrisis E et al. (1982) [4]	70	88.70%	14.30%	-
Mandarin LCA (1983) [7]	25	68.20%	10.60%	4.50%
Garcia PJA (1988) [8]	181	92.82%	7.18%	-
Sow ML (1991) [9]	32	84%	16%	-
Silva LFA (2010) [10]	-	93.34%	6.66%	-
Chaware PN et al. (2012) [11]	-	85.58%	14.42%	-
Swamy VL et al. (2013) [12]	60	66%	17%	17%
Londhe SR et al. (2013) [13]	50	90%	10%	-
Present study	**100**	**69%**	**25%**	**6%**

About 1–2 centimetres from the spleen's hilum, the splenic artery splits into terminal branches. The average distance in this research between the splenic artery's endpoint and the spleen's hilum was 2.3 centimetres, with a range of 0.5 to 6.3 centimetres. Lipschultz [12] saw a range of 7 cm in the distance. Piquand [11] found that 76 percent of samples split 2–3 centimetres distant from the hilum, whereas 24 percent split just at the hilum. According to research by Garcia et al., 97% of the time the splenic artery forked off into terminal branches after passing through the hilum, whereas in the remaining 3% it remained unbranched. [8] Table 4 provides a comparison to previous research.

Table 4: Comparison of the mean distance between the termination of splenic artery and the hilum of the spleen with the previous study and hilum.

Author	Mean distance (in cm)
Silva LFA et al [10]	2.89
Holibkova A et al. [14]	2.8
Present study	**2.3**

CONCLUSION

Because of its great vascularity and fragility, the spleen is an organ that is often overlooked. With both haematological and immunological activities, it is the most important secondary lymphoid organ in the body. An altered haematological picture and a loss in immunity are the results of total splenectomy, which is routinely performed following a splenic damage. A segmental branch of the splenic artery may be ligated to perform a partial splenectomy, which is one method of avoiding complications. Because it is split into segments by fibrous septa and each segment has its own major artery, splenectomy may be performed in stages. Segmentation of the spleen may have resulted through the spleen's own development or from the terminal division of the artery supplying the organ. Gaining a deeper understanding of the segmental distribution of the splenic artery and its variations is crucial for its partial excision.

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