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A Study of Relationship of Celiac Ganglion with Celiac Artery and Superior Mesenteric Artery

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Abstract: ***Background:*** ***Anatomical variations of celiac ganglion are a subject of interest amongst anatomist of all over world, with a difference of opinion regarding its various parameters. The term celiac plexus is related to the proximity of the ganglion to celiac artery. The study was conducted to find out the relationship of celiac ganglion with the celiac artery and superior mesenteric artery, so that a predictable pattern of relationship could be established.*** ***Methods:*** ***Twenty embalmed adult cadavers (17 males and 3 females) were dissected for this study. In all the bodies a midline abdominal incision was given. Abdominal organs such as liver, stomach, spleen, duodenum, small intestine was removed with the preservation of diaphragm, posterior abdominal wall and abdominal aorta with its branches. The celiac ganglion was identified the peritoneum on its anterior surface was removed carefully. Great care was taken to not to disturb the ganglion from underlying fascia and thus to preserve the true anatomical relation to celiac artery and superior mesenteric artery.*** ***Conclusion:*** ***The ganglion was inferolateral to celiac artery in 90% (18 out of 20) cases on right side and 80% (16 out of 20) cases on left side. 10% ganglia on right and 20% ganglia on left side were superolateral to the celiac artery. The ganglion was superolateral to the superior mesenteric artery in 80% (16 out of 20) cases on right side and 85% (17 out of 20) cases on left side. It was inferolateral to superior mesenteric artery in 20% (4 out of 20) cases on right side and 15% (3 out of 20) cases on left side.***

Keywords: Celiac ganglion, Celiac Artery, Superior mesenteric artery

1. Introduction

The location of the celiac ganglia is usually described in relation to surrounding structures, and also show variation in size and general morphology. Clinically, the celiac plexus plays a major role in pain management for upper abdominal disorders, particularly chronic pancreatitis and pancreatic cancer. Anatomical variations of celiac ganglion are a subject of interest amongst anatomist of all over world, with a difference of opinion regarding its various parameters. It is the largest plexus of sympathetic nervous system. The term celiac plexus is related to the proximity of the ganglion to celiac artery. The study was conducted to find out the relationship of celiac ganglion with the celiac artery and superior mesenteric artery, so that a predictable pattern of relationship could be established.

2. Material and Methods

Twenty embalmed adult cadavers (17 males and 3 females) were dissected for this study in the department of Anatomy, Maulana Azad Medical College, New Delhi, India. In all the bodies a midline abdominal incision was given. Abdominal organs such as liver, stomach, spleen, duodenum, small intestine was removed with the preservation of diaphragm, posterior abdominal wall and abdominal aorta with its branches. The celiac ganglion was identified the peritoneum on its anterior surface was removed carefully. Great care was taken to not to disturb the ganglion from underlying fascia and thus to preserve the true anatomical relation to celiac artery and superior mesenteric artery.

Figure 1: Showing left celiac ganglion and its relation with celiac trunk and superior mesenteric artery.

3. Results

Relations of the ganglion to celiac artery:

The ganglion was inferolateral to celiac artery in 18 out of 20 cases on right side and 16 out of 20 cases on left side. 2 ganglia on right and 4 ganglia on left side were superolateral to the celiac artery.

Table 1(a): Relation of the celiac ganglion with the celiac artery

Cadaver	Sex	Right Ganglion	Left Ganglion
1	Male	Superolateral	Superolateral
2	Male	Superolateral	Superolateral
3	Male	Inferolateral	Inferolateral
4	Male	Inferolateral	Inferolateral
5	Male	Inferolateral	Inferolateral
6	Male	Inferolateral	Inferolateral
7	Male	Inferolateral	Superolateral
8	Female	Inferolateral	Superolateral
9	Male	Inferolateral	Inferolateral
10	Male	Inferolateral	Inferolateral
11	Male	Inferolateral	Inferolateral
12	Male	Inferolateral	Inferolateral

13	Male	Inferolateral	Inferolateral
14	Male	Inferolateral	Inferolateral
15	Male	Inferolateral	Inferolateral
16	Male	Inferolateral	Inferolateral
17	Female	Inferolateral	Inferolateral
18	Female	Inferolateral	Inferolateral
19	Male	Inferolateral	Inferolateral
20	Male	Inferolateral	Inferolateral

Table 1(b): Relations of the celiac ganglion with celiac artery

	Superolateral	Inferolateral	Total
Right side	2	18	20
Left side	4	16	20
Total	6	34	40

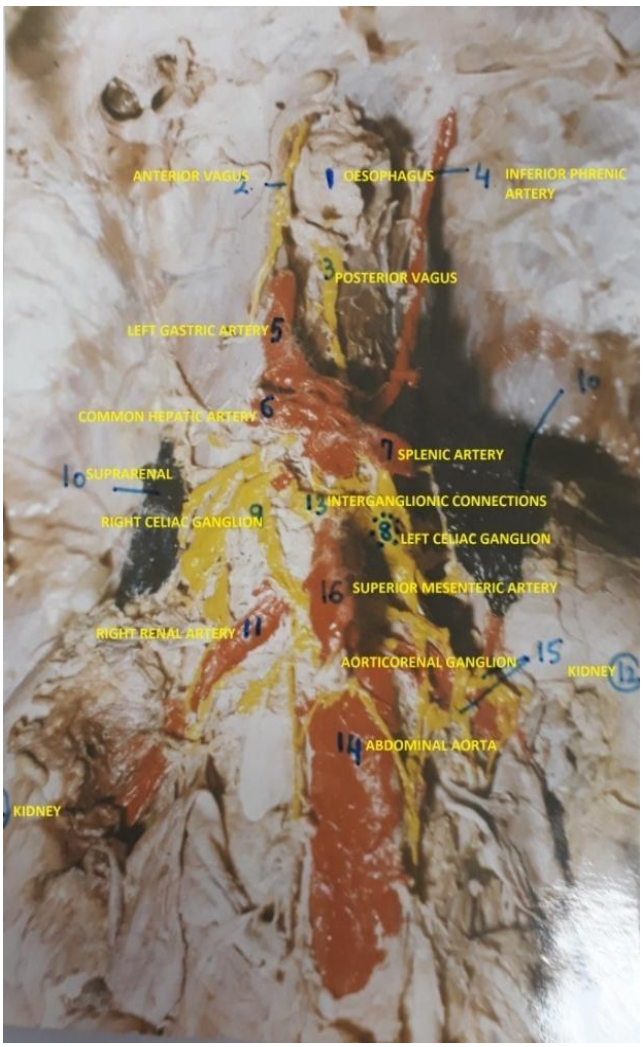

Figure 2: Showing right and left celiac ganglion and the relation with celiac artery and superior mesenteric artery.

Relation of the celiac ganglion with superior mesenteric artery. The ganglion was superolateral to the superior mesenteric artery in 16 out of 20 cases on left side. It was inferolateral to superior mesenteric artery in 4 out of 20 cases on right side and 3 out of 20 cases on left side.

Table 2(a): Relation of the celiac artery with superior mesenteric artery

Cadaver	Sex	Right ganglion	Left ganglion
1	Male	Superolateral	Superolateral
2	Male	Inferolateral	Superolateral
3	Male	Superolateral	Inferolateral
4	Male	Inferolateral	Superolateral
5	Male	Superolateral	Superolateral
6	Male	Superolateral	Superolateral
7	Male	Superolateral	Superolateral
8	Female	Superolateral	Superolateral
9	Male	Superolateral	Superolateral
10	Male	Superolateral	Superolateral
11	Male	Superolateral	Superolateral
12	Male	Inferolateral	Inferolateral
13	Male	Superolateral	Superolateral
14	Male	Superolateral	Superolateral
15	Male	Superolateral	Superolateral
16	Male	Inferolateral	Superolateral
17	Female	Superolateral	Superolateral
18	Female	Superolateral	Superolateral
19	Male	Superolateral	Superolateral
20	Male	Superolateral	Superolateral

Table 2(b): Relation of celiac ganglion with superior mesenteric artery.

	Superolateral	Inferolateral	Total
Right side	16	4	20
Left side	17	3	20
Total	33	7	40

4. Discussion

The celiac plexus serves as a redistribution or synaptic centre for autonomic fibres of all the abdominal viscera except pelvic organs. It contains visceral efferent neurons of both the sympathetic and parasympathetic outflows, and in addition, visceral afferent fibres which mediate sensory impulses to the central nervous system via either the sympathetic or the parasympathetic nervous system (3). The plexus is located deep in the retroperitoneum, over the anterolateral surface of the aorta and around the origin of celiac trunk. It serves as a relay centre for nociceptive impulses that originates from the upper abdominal viscera (8). Chronic abdominal pain is a significant health problem in society today. It is readily prevalent in up to 75% of adolescents and 50 % of adults (5, 7). Chronic abdominal pain is the most reason for outpatient clinic visit (3).

Celiac plexus neurolysis is an effective means of diminishing pain that arises from these structures. Celiac ganglion is located near the origin of celiac artery and superior mesenteric artery (10,2). (13) found that left ganglion is slightly more caudal than the right to the celiac artery. Because of indistinct boundaries, considerable variation of the plexus in relation to great vessels like celiac artery and superior mesenteric artery is expected. (1, 4, 6) described the celiac ganglia lying on either side of aorta at the level of origin of celiac artery. In our study we found that 34 out of 40 ganglia (18 on right and 16 on left) were inferolateral to the celiac artery. These observations were similar to the findings of (14) that the celiac ganglion was inferior to the origin of celiac artery and the ganglion was directed inferolaterally. In our study 6 ganglia (2 on right

and 4 on left) were superolateral to celiac artery. These findings can be compared to the observations of (9) who found 2 ganglia lying on respective crura of the diaphragm and flanking the aorta lateral to the origin of celiac artery.

33 out of 40 ganglia (16 on right and 17 on left) were superolateral to the superior mesenteric artery. 4 ganglia (1 on right and 3 on left) were inferolateral to superior mesenteric artery. These findings can be compared with (12) who found the relations among ganglia, celiac and superior mesenteric artery. They found 96% of the ganglia were related to both vessels on both sides. In 4% of cases the ganglia were related to superior mesenteric artery only and had no relation to the celiac artery at all.
The findings of this study can also be compared to the observations of (8, 11). The study shows that the relationship of the ganglion to the celiac and superior mesenteric artery varies not only from case to case but also in same person. This fact is of great importance for the clinicians while using celiac plexus block for the intractable pain of upper abdominal malignancies.

5. Conclusions

Relations of the ganglion to celiac artery: (Table:1a & 1b). The ganglion was inferolateral to celiac artery in 90% (18 out of 20) cases on right side and 80% (16 out of 20) cases on left side. 10% (2 out of 20) ganglia on right and (4 out of 20) 20% ganglia on left side were superolateral to the celiac artery. Relation of the celiac ganglion with superior mesenteric artery: (Table:2a & 2b)

The ganglion was superolateral to the superior mesenteric artery in 80% (16 out of 20) cases on right side and 85% (17 out of 20) cases on left side. It was inferolateral to superior mesenteric artery in 20% (4 out of 20) cases on right side and 15% (3 out of 20) cases on left side.

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7. Conflict of Interest

None

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