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MORPHOMETRIC PARAMETERS OF THE INITIAL SECTION OF THE CELIAC TRUNK IN RESIDENTS OF THE GOMEL REGION

Introduction

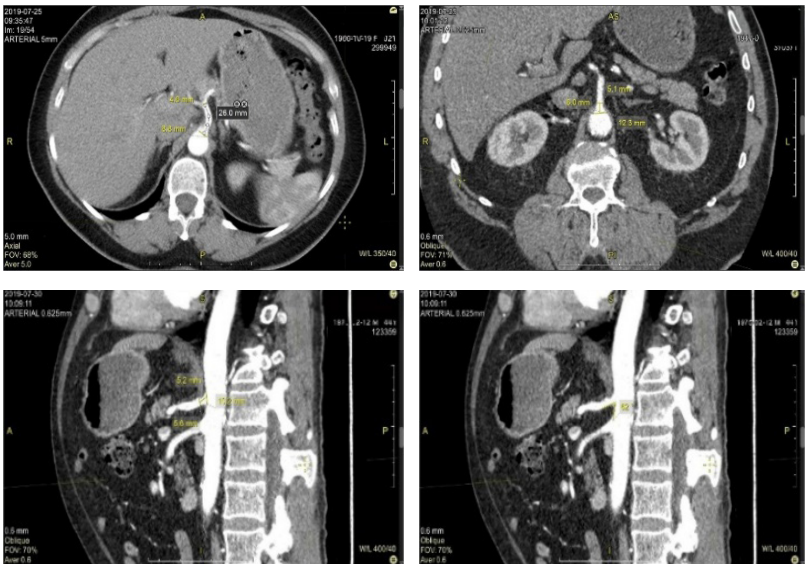
The celiac trunk typically branches into the left gastric, splenic, and common hepatic arteries, supplying blood to the upper abdominal organs. Its morphometric parameters – diameter, length, and vertebral level of origin – are clinically important for surgical planning and interventions. While global anatomical data exists, population-specific and gender-specific differences can influence clinical outcomes. This study establishes normative morphometric data for the celiac trunk in Gomel region residents using CTA scans and compares these findings with published normative data from the Sri Lankan population, with separate analysis for males and females in both groups.

Goal

We measured the diameter, length, and vertebral level of the celiac trunk in Gomel region patients using CTA scans, with separate analysis for males and females. Anatomical variant frequency was also documented by gender. These findings were compared with published Sri Lankan gender-specific norms to identify population and gender differences.

Material and methods of research

CTA scans of 19 adults (12 males, 7 females, aged 44–75) from Gomel region were examined using Vidar Dicom Viewer. Measurements included celiac trunk dimensions (entry/exit diameters in horizontal and sagittal planes, length, angle with aorta) and vertebral level of origin. Two patients with variants were excluded from morphometric analysis. Microsoft Excel was used for descriptive statistics with separate analysis for male and female subgroups. The results were then compared with published gender-specific normative data for the Sri Lankan population obtained from existing anatomical studies.



Picture 1 – CTA scans with 2 planes

The results of the research and their discussion

Definitions of measured parameters:

● Full length of the celiac trunk – Distance from its origin at the aorta to its division into the three main branches.

● Angle – The inferior angle between the celiac trunk and abdominal aorta, measured in the sagittal plane.

Funnel segment parameters:

● Enter – Diameter at the origin (where the celiac trunk emerges from the aorta).

● Exit – Diameter after the initial funnel-shaped segment, where the trunk becomes stable.

● Distance – Length of the funnel segment between the enter and exit points.

Variant definition:

● Celiacomesenteric trunk (CMT) – Rare variant where the celiac trunk and superior mesenteric artery arise from a single common origin on the aorta.

Table 1 – Celiac trunk anatomy

Patient ID	Gender	Age (years)	Full length of celiac trunk (mm)	Skeletopy	Enter (mm)	Horizontal exit (mm)	Plane distance (mm)	Enter (mm)	Sagittal exit (mm)	Plane distance (mm)	Angle (°)
296033	M	59	23.5	L1	15.4	7.1	10.2	8.6	6.2	5.2	74
749	F	69	24	Between T12 & L1	14.4	5.6	7.2	11.5	6	5.6	24
717	M	55	45.9	Between T12 & L1	13.7	6.5	6	10.8	6.3	5	6
157022	F	55	20.4	Between T12 & L1	12.4	8.4	7.8	10.4	5.3	5.3	44
267974	F	69	30.7	T12	9.6	4.9	4.6	10	5.5	5.1	25
5317	F	56	27.4	Between T12 & L1	11.9	7.6	6.8	12.5	6.4	6	31
123359	M	44	26.7	L1	11.4	4.6	5.4	10.2	5.6	5.2	62
370571	M	72	28.1	L1	12.3	5.1	6	11	5.1	5.1	99
53906	F	74	29.1	L1	12.6	8.1	6.3	14.4	8.5	7.7	41
557668	M	52	25.4	T12	14.1	6.7	7.4	14	6.6	5.5	49
588686	M	72	33.7	T12	13.8	6.8	5.5	12.8	6.9	5.4	44
588542	M	52	27.7	T12	10.2	5.8	4.9	11.5	6.1	5.3	34
309627	M	75	39.1	T12	13	6.9	3.5	11.4	7.7	5.9	40
587952	M	44	25.8	L1	14.7	6.5	5.5	11.2	6.9	4.8	38
53475	M	43	29.6	L1	11.6	8.5	7.8	15	8.7	10.4	33
445107	M	74	21.4	L1	9.5	5.5	5.8	9.9	6	9.9	29
582940	M	65	29.9	Between T12 & L1	12.4	8.2	5.3	14.2	8.2	9.5	27

Analysis of 17 Gomel patients with typical celiac trunk anatomy showed a mean length of 28.7 mm with funnel-shaped morphology. In the horizontal plane, mean entry diameter was 12.6 mm, exit 6.8 mm, funnel length 6.3 mm. In the sagittal plane, mean entry was 12.2 mm, exit 6.7 mm, funnel length 6.6 mm. Origin was most common at L1 (7 patients), followed by T12 (5) and between T12–L1 (5). Gender differences were observed. Males (n=11) had mean length 29.4 mm versus 27.8 mm in females (n=6). Horizontal entry diameter was 13.1 mm in males and 11.9 mm in females. Two variants were found: one celiacomesenteric trunk and one complete agenesis. Compared to Sri Lankan norms, our findings show similar gender patterns. Sri Lankan males have

mean length 28.4 mm, females 27.3 mm. However, Sri Lankan diameter at origin (males 8.2 mm, females 7.3 mm) is smaller than our CTA measurements, likely due to methodological differences between cadaveric and in-vivo imaging. Sri Lankans typically originate at T12, while our patients showed more variable origins with tendency toward L1, particularly in males.

Pearson correlation analysis significant age-related changes: horizontal entry ($p=4.95\times10^{-5}$), horizontal exit (p=0.00062), horizontal funnel length (p=0.000805), sagittal entry (p=0.000191), sagittal exit (p=0.000685), and total length (p=0.013973). Sagittal funnel length showed borderline trend (p=0.062808), while angle showed no correlation with age (p=0.48543). Significant correlations were found between horizontal and sagittal entry diameters (p=0.00343) and funnel lengths (p=0.009033). Sagittal funnel length correlated with angle (p=0.023981), but horizontal funnel length did not (p=0.4363).

Table 2 – Gender-Based Comparison of Celiac Trunk Anatomy – Gomel Region vs. Sri Lankan Literature Norms

Parameter	Gomel Region Males (n=11)	Gomel Region Females (n=6)	Sri Lankan Males (Literature)	Sri Lankan Females (Literature)
Mean Total Length	29.4 mm	27.8 mm	28.4 mm	27.3 mm
Mean Diameter at Origin	12.9 mm*	11.7 mm*	8.2 mm (external)	7.3 mm (external)
Typical Skeletopy (Origin)	L1 (6), T12 (3), T12-L1 (2)	L1 (1), T12 (2), T12-L1 (3)	T12	T12
Typical Branching Pattern	91.7% (11/12)	85.7% (6/7)	86.6%	82.1%
Notable Variants	CMT (1 male)	Complete agenesis (1 female)	Splenogastric trunk (1 male)	Hepatosplenic trunk (2 females)

Two variant cases were identified in our Gomel cohort (10.5%): one male patient presented with a celiacomesenteric trunk, and one female patient had no celiac trunk with branches arising independently. This gender distribution of variants aligns with Sri Lankan literature, where males showed splenogastric trunk and females showed hepatosplenic trunk variations. The variant frequency in both populations (Gomel: 10.5%, Sri Lanka: 15.16%) reinforces the universal need for individualized preoperative assessment regardless of gender or population.

Statistical analysis within the Gomel group revealed that males consistently showed larger diameters and longer trunk lengths compared to females, a pattern also reflected in the Sri Lankan literature. These gender differences, while not always statistically significant in small samples, have potential clinical implications for vascular access and surgical planning.

Conclusions

This study establishes gender-specific reference values for the celiac trunk in Gomel region residents and compares them with Sri Lankan population norms. Males in both populations demonstrate larger diameters and longer trunk lengths compared to females. While total trunk length is similar between populations when comparing same genders, differences in diameter at origin likely reflect measurement methodology rather than true population variation. The 10.5% incidence of anatomical variants in our cohort, with different variant types observed between genders, underscores the need for preoperative imaging. These findings enhance surgical safety for both populations and provide a basis for future research with larger gender-balanced samples.

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PREVALENCE AND DISTRIBUTION OF ATHEROSCLEROTIC PLAQUES IN THE AORTIC ROOT SINUSES

Introduction

The aortic sinuses are three small pouches located at the root of the aorta. These structures create a swirling blood flow pattern that serves to cushion the valve leaflets during each cardiac cycle and ensures proper closure of the valve afterward. Two aortic sinuses are associated with specific coronary arteries: the right and left coronary sinuses give rise to their respective coronary arteries, while the non-coronary sinus does not supply a coronary artery [3].

In contemporary clinical practice, the prevalence of cholesterol-related pathologies within the aorta has markedly increased [4]. With aging populations and escalating rates of cardiovascular disease, a significant number of individuals are developing atherosclerotic plaques within their arterial systems. While extensive research has been conducted on atherosclerotic plaques in the coronary arteries and the main aorta, there remains a notable paucity of studies focusing specifically on the aortic sinuses. This is particularly concerning given that plaques present in these regions can directly obstruct blood flow to the myocardium [2, 4].

Our objective is to investigate the frequency of cholesterol plaque formation within the aortic sinuses, as well as to ascertain whether there is a predilection for specific sinuses. We aim to provide valuable insights that may enhance the understanding and management of aortic atherosclerosis.

Goal

The objective of this study was to establish the frequency of atherosclerotic plaques developing in the aortic root.

Material and methods of research

This morphological study was carried out at the Department of Normal Anatomy, 38 human hearts obtained from routine autopsy specimens. All specimens were handled in accordance with standard ethical protocols and institutional guidelines governing the use of cadaveric material for medical research purposes. The study sample comprised hearts from 18 males and 18 females with an additional 2 for whom sex information was not recorded. The age distribution showed a median age of 68.50 years, with an interquartile range spanning from 52.00 to 78.50 years – a demographic profile particularly well-suited for investigating atherosclerotic changes, as these lesions typically require decades to develop and become increasingly prevalent with advancing age.

The ascending aorta was transected above the sinutubular junction to expose the aortic root, and each sinus was identified based on coronary ostia: right coronary (right artery origin), left coronary (left artery origin), and non-coronary (no ostium). Every sinus was examined for