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Research Article

A cadaveric study for structural variations of the stomach

K. Yesupadam[1]*, K. V. N. Geetha Devi[2], V. V. V. Lakshmi[3]

[1]Department of Anatomy, Guntur Medical College, Guntur, Andhra Pradesh, India
[2]Department of Anatomy, ACSR Government Medical College, Nellore, Andhra Pradesh, India
[3]Department of Anatomy, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India

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***Correspondence:**
Dr. K. V. N. Geetha Devi,
E-mail: geethadevi297@gmail.com

ABSTRACT

Background: The morphology of the stomach taken for the study for its clinical interventions like gastro-oesophagial reflux disorders (GERD) which are very common nowadays because of unusual timing of eating food, stress related jobs, eating of junk foods etc. The obesity now considered to be the 2nd leading cause of death, which can be prevented by gastric reconstructive procedures i.e., the bariatric surgeries.
Methods: The study includes 70 adult cadavers, 28 obtained from the formalin fixed specimens kept for anatomy dissection for 1st year MBBS students from 2009 batch to 2015 batch. The remaining 42 specimens obtained from the postpartum bodies in the Forensic department of Guntur Medical College, Guntur. The abdominal cavity opened according to the incisions in the Cunninghams manual of anatomy. Stomach identified by reflecting anterior abdominal wall. Location noted, shape observed, Length taken, relations blood supply noted, results tabulated.
Results: 71.4% specimens are "J" shaped, 14.2% are reverse "L" shaped, 7.2% are cresentic shaped, 7.2% are cylindrical shaped observed. The length is more in "J" shaped specimens. The lower extent of greater curvature at L3 in 71.4% specimens, at L2 in 21.4% specimens, at L4 in 7.2% specimens.
Conclusions: The present study discussed about the shape of the stomach and the majority of specimens shown "J" shape. Remaining are reverse "L" shape; cresentic and cylindrical shaped.

Keywords: Stomach, "J" shape, Reverse "L" shape, Cresentic shape, Cylindrical shape

INTRODUCTION

The stomach is the most dilated part of the digestive tube and intervenes between Oesophagus and the first part of the duodenum. The stomach acts as a reservoir of food, converts the food into chyme by churning movements and allows the digestion of proteins in to peptones and proteases under influence of hydrochloric acid.

The stomach also secretes abundant mucus which act as a protective barrier of mucous membrane. The mucosa of stomach allows some absorption of water, glucose, alcohol and some salts. The stomach secrete a hormone gastrin which regulates the secretion of pepsin and Hcl. An intrinsic factor is eloberated for the absorption of B12 vitamin in the small intestine.[1] The stomach is situated in the epigastrium, left hypochondrium and umbilical regions.[2] The stomach is a muscular bag relatively fixed at both ends, mobile else-where. The main parts of stomach are fundus, body and pylorus, with greater and lesser curvatures forming left and right borders with the attachment of greater and lesser omentum respectively.[3]

In most of the people the stomach is "J" shaped. It receives rich arterial supply from the all three branches of coeliac trunk. Left and right gastric arteries anastomose in the lesser curvature. Right and left gastro epiploic arteries anastomose in the inferior part of greater curvature. The veins drains into the corresponding named vessels which drain in to portal vein. The stomach is also

having rich lymphatic plexus mainly drains into pancreatico-splenic and pyloric nodes. Stomach receives parasympathetic innervations through anterior and posterior vagal trunks. Sympathetic fibres reach the stomach through the celiac plexus.[4]

The shape of stomach Ernest. W. April described that when it is empty appears tubular or "J" shape expect for the bulge of fundus.[5] William Montagna stated that the identification of stomach is not based upon the shape (or) location but on type of epithelium and glands it contain, the lining epithelium is simple columnar epithelium forms the cardiac, fundic and pyloric glands. The glands secrete gastric juices which contain gastrin hormone, mucus, pepsin and hydrochloric acid and an intrinsic factor is eloberated successfully which are useful for digestion of food.[6] Ranganathan TS described the shape of stomach is pear shaped.[7]

Existance of gastric ulceration was acknowledged by Dioeles of carystus – 350 BC, Celsus and Galen. Marcellus Donatus in- 1586 first described gastric ulcer at autopsy. Morgagni described both gastric and duodenal ulcers at autopsy in the year 1737. Sidney Jones – 1875 done first feeding gastrostomy. Billroth was the first surgeon successfully resected the distal stomach (gastroduodenectomy). Hirsprung wrote first complete description of congenital hypertrophic pyloric stenosis. Ramsted described operation to alleviate CHPS.[8] Correa HWP studied developments of gastric cancers over past decade.[9] Gupta JP, Jain AK et al studied about the gastroscopic cytology and biopsies in diagnosis of gastric malignancies.[10]

Nasogastric intubation is a routine procedure to decompress the stomach in abdominal surgeries, for stomach wash and for feeding purposes. The excess collection of gas in fundus causes pressure on heart which mimic angina. The body of the stomach is used for classical anterior (or) posterior gastro jejunostomy.

Pyloric antrum is the commonest site for gastritis, peptic ulcers and cancer. Incompetance of pyloric spincter results in severe gastro duodenal reflux. Because of extensive extramuraland intramural anastomosis, the erosion of gastric ulcer (or) gastric cancer to the perigastric vessels leads to life threatening haemorrhage. Use of barium in evaluation of disorders of upper GIT. Current status discussed by Opden – Orth J.O.[11]

With the recent advances in the diagnostic techniques we can study in detail about the pathological conditions of stomach i.e., ultrasonography, fibro optic endoscopy, computerized tomography (CT Scan), magnetic resonance imaging (MRI) and positron emission tomography scanning (PET Scan). The basic anatomical knowledge regarding stomach is essential for inter pretations in diagnostic procedures new chemotherapy strategies for cancers coined by Kubota T.[12]

METHODS

The present study conducted in adult cadavers ; 28 were obtained from the embalmed cadavers which are placed for dissections in the Department of Anatomy Guntur Medical College, Guntur for 1st year MBBS Students during the years 2008-09 to 2014-15, and 42 specimens were obtained from the postmartum bodies in the Department of forensic medicine, Guntur medical college, Guntur. Out of 70 cadavers 50 are males and 20 are females.

A vertical midline incision from xiphisternum to pubic symphysis and two horizontal incisions along the costal margin and along the inguinal ligament given according to Cunninghams manual of anatomy. The layers of anterior abdominal wall reflected to expose the stomach. The stomach identified, location observed. Shape of stomach noted and recorded. The length is measured and noted, relations with the surrounding structures observed. The lower extent of greater curvature observed and noted. Variations observed.

RESULTS

For the shape of stomach

Out of 70 specimens 50 are "J" shaped, 10 are reverse "L" shape, 5 are cresentic and the remaining 5 are cylindrical.

Figure 1: "J" shaped stomach.

Figure 2: Reverse "L" shape stomach.

For the length

In the "J" shaped stomachs the length is more, and the length is less in cresentic stomachs. The length varies between 9 -11 inches in J shaped specimens, 9-10 inches in reverse "L" specimens, 8-9 inches in cylindrical specimens, 7-8 inches in cresentic specimens.

The average length in J shaped stomach is 10 inches and the average width is 5 inches. The all specimens situated according to description of authors. The specimens extended between cardiac orifice to pyloric orifices. The extent of greater curvature at the level of L3 in 50 specimens, at the level of L2 in 15 specimens, and at the level of L 4 in 5 specimens.

Figure 3: Cylindrical shape stomach.

Figure 4: Crescentic shape stomach.

Table 1: Shapes of stomach.

S. No.	Sex	Shape of stomach in adults
Al	Male	J
A2	Male	J
A3	Male	Reverse 'L'
A4	Male	J
A5	Female	J
A6	Female	J
A7	Female	J
A8	Male	J
A9	Male	J
A10	Female	J
All	Female	J
A12	Male	J
A13	Male	Reverse 'L'
A14	Male	J
A15	Male	Crescentic
A16	Female	Cylindrical
A17	Female	J
A18	Male	J
A19	Male	Crescentic
A20	Male	J
A21	Male	J
A22	Male	J
A23	Male	J
A24	Male	Cylindrical
A25	Female	Reverse 'L'
A26	Female	Crescentic
A27	Male	J
A28	Female	Reverse 'L'
A29	Male	J
A30	Female	J
A31	Male	Crescentic
A32	Male	J
A33	Male	J
A34	Male	J
A35	Male	J
A36	Male	J
A37	Male	Cylindrical
A38	Female	Reverse 'L'
A39	Male	J
A40	Male	J
A41	Male	J
A42	Male	Reverse 'L'
A43	Female	Cylindrical
A44	Female	J
A45	Female	J
A46	Male	Reverse 'L'
A47	Male	J
A48	Male	J
A49	Male	Cylindrical
A50	Male	J
A51	Female	Reverse 'L'
A52	Female	J
A53	Male	J
A54	Male	J
A55	Male	Crescentic
A56	Male	J
A57	Male	J
A58	Male	J
A59	Male	J
A60	Male	J
A61	Female	J
A62	Male	Reverse 'L'
A63	Male	J
A64	Male	J
A65	Male	J
A66	Male	J

A67	Male	Reverse 'L'
A68	Female	J
A69	Female	J
A70	Male	J

Table 2: Length of stomach.

S. No	Sex	Length of stomach (inches)
Al	Male	11
A2	Male	11
A3	Male	9
A4	Male	10
A5	Female	10
A6	Female	10
A7	Female	11
A8	Male	11
A9	Male	10
A10	Female	9
All	Female	9
A12	Male	11
A13	Male	9
A14	Male	11
A15	Male	9
A16	Female	8
A17	Female	11
A18	Male	10
A19	Male	8
A20	Male	9
A21	Male	11
A22	Male	11
A23	Male	10
A24	Male	7
A25	Female	10
A26	Female	9
A27	Male	11
A28	Female	10
A29	Male	11
A30	Female	10
A31	Male	9
A32	Male	10
A33	Male	11
A34	Male	10
A35	Male	11
A36	Male	11
A37	Male	8
A38	Female	9
A39	Male	10
A40	Male	10
A41	Male	10
A42	Male	10
A43	Female	7
A44	Female	9
A45	Female	9
A46	Male	10
A47	Male	9
A48	Male	10
A49	Male	8
A50	Male	11
A51	Female	9
A52	Female	10
A53	Male	11
A54	Male	11
A55	Male	8
A56	Male	10
A57	Male	11
A58	Male	9
A59	Male	9
A60	Male	10
A61	Female	11
A62	Male	10
A63	Male	11
A64	Male	10
A65	Male	10
A66	Male	11
A67	Male	10
A68	Female	9
A69	Female	10
A70	Male	11

Table 3: Extent of greater curvature.

S. No	Sex	Lower extent of greater curvature of stomach in adult
Al	Male	L3
A2	Male	L3
A3	Male	L2
A4	Male	L3
A5	Female	L3
A6	Female	L3
A7	Female	L4
A8	Male	L3
A9	Male	L3
A10	Female	L3
All	Female	L3
A12	Male	L3
A13	Male	L3
A14	Male	L3
A15	Male	L3
A16	Female	L2
A17	Female	L2
A18	Male	L3
A19	Male	L3
A20	Male	L3
A21	Male	L3
A22	Male	L3
A23	Male	L3
A24	Male	L2
A25	Female	L3
A26	Female	L2
A27	Male	L3

A28	Female	L3
A29	Male	L4
A30	Female	L3
A31	Male	L3
A32	Male	L3
A33	Male	L3
A34	Male	L3
A35	Male	L4
A36	Male	L3
A37	Male	L2
A38	Female	L3
A39	Male	L3
A40	Male	L3
A41	Male	L3
A42	Male	L3
A43	Female	L2
A44	Female	L3
A45	Female	L2
A46	Male	L3
A47	Male	L2
A48	Male	L3
A49	Male	L2
A50	Male	L4
A51	Female	L2
A52	Female	L3
A53	Male	L3
A54	Male	L3
A55	Male	L3
A56	Male	L3
A57	Male	L3
A58	Male	L2
A59	Male	L2
A60	Male	L3
A61	Female	L3
A62	Male	L3
A63	Male	L3
A64	Male	L3
A65	Male	L3
A66	Male	L2
A67	Male	L3
A68	Female	L2
A69	Female	L3
A70	Male	L3

Table 4: Showing shapes and lengths.

S. No.	No. of adult specimen	Length of stomach (inch)	Shape of stomach	Percentage
1	50	9-11	J Shape	71.4
2	10	9-10	Reverse 'L'	14.2
3	5	8-09	Crescentic	7.2
4	5	7-8	Cylindrical	7.2

DISCUSSION

The location of stomach lies in the epigastric, left hypochondirc and umbilical regions of abdomen, it extends between lower end of Oesophagus and 1st part of duodenum, was described by the authors in Gray's anatomy, Grant's anatomy, last's anatomy Hollinshed WH anatomy and Ranganathan TS anatomy. The present study coincides with the authors 100%.

The shape of the stomach described by majority of authors as "J" shape. Ranganathan TS described as pear shaped structure.

In the Calanders surgical anatomy the shape of stomach is given as cornucopia. In present study 71.4% stomachs are J shaped; 14.2% are reverse "L" shaped; 7.2% are cylindrical and 7.2% are crescentic shaped which coincides with the Calanders description.

CONCLUSION

The majority of specimens are "J" shaped. The length of J shaped stomachs are more when compared with cresentic shaped stomach. The extent of greater curvature at different levels. In 71.4% specimens are at the levels of L3; 21.4% specimens are at the level of L2 and the remaining 7.2% at the L4.

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