Bulletin UASVM, Veterinary Medicine 67(1)/2010
ISSN 1843-5270; Electronic ISSN 1843-5378

Contributions to The Study of the Esophagus and Stomach Morphology in Laboratory Mouse

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Abstract. Aim of the study is to illuminate some data on gastric esophageal junction morphology in laboratory mouse brings explanations on mice unable to vomit.There are few literature data on the conformation and structure of the laboratory mouse esophagus and stomach. They try to explain why the mouse can not vomit. Deviating slightly to the left only in the cervical region the esophagus runs mainly in the cervicalregion the esophagus runs mainly midsagittally along the dorsal aspect of the trachea. Its length is abaut 30 mm(3, 4). Throughaut its length the diameter is abaut 2 mm. Throughaut its length the diameter is abaut 2 mm. The epithelium of the esophagus is moderately to extensively cornifield. The submucosa is free of gland. Both layers of the muscular coat are made budles of skeletal muscle. The esophagus enters the middle of the lasser curvature. The **esophageal sphincter** is a circular muscle that surrounds the base of the esophagus. At its lower edge, it has muscle fibers that insert into the limiting ridge. So when the sphincter contracts, it not only constricts the walls of the esophagus, it also pulls the sides of the limiting ridge's "U" together, thus hiding and tightly closing the esophageal opening. Muscle layer is formed on the entire length of skeletal muscle fibe

Keywords: esophagus, stomach, Laboratory mouse

INTRODUCTION

There are few literature data on the conformation and structure of the laboratory mouse esophagus and stomach. They try to explain why the mouse can not vomit. Dissection was performed on a total of 20 laboratory mice, using appropriate instruments. Histological preparations were processed by usual methods (Frossmann, W.G. L., Orci, R., and col., 1969).

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The stomach is oriented transversely and lies mainly caudal to the rib cage in the left cranial part of the abdominal cavity. The esophagus enters the middle of the lasser curvature. The stomach represents 0,5% of the body weight (Margaret J. (1965). The stomach consisted of two distinct parts: the left part (non-glandular, proventriculus or forestomach) was greyish, thin-walled and slightlytransparent, and the right part (glandular orventriculus) was white and thick-walled (Musser, G.G. and Carleton, M.D. 2005).

Anatomical textbooks on rats usually mention in passing that rats can't vomit. They tend to implicate the limiting ridge or the lack of striated muscle in the rat's esophagus, and sometimes both (Smith, E. M., and col., 1968, Stuart R.R., 1947), but these textbooks do not go into more detail about exactly *how* these features of a rat's anatomy prevent a rat from vomiting, or if there are any other features involved. Rats cannot vomit, but they do *regurgitate* occasionally (Spines, Robert L. 1982).

MATERIALS AND METHODS

Dissection was performed on a total of 20 laboratory mice, using appropriate instruments. Formations resulting from anatomical dissection were photographed pictures are processed for better visibility. Esophagogastrica region pieces were taken to achieve histological preparations. Histological preparations were processed by usual methods. The topographical situation, omentum connections and arterial supply to the esophagogastric junction were examined macroscopically. Dried specimens were made to study the morphological form and internal structures.

RESULTS AND DISCUSSION

The esophagus is a hollow body with laminated musculomembranoasa structure which connects farige and stomach. After the trajectory it can be systematized into three portions: cervical, thoracic and abdominal. Cervical portion is one that crosses the entire length of neck, it starts at the caudal end portion of the pharynx esophagus (esophageal vestibule) and ends in the right breast coming in to the first pair of ribs. Cervical portion has a length of about 15 mm initial portion is located in the median dorsal neck trachea and in the middle portion is located on the left side of the neck so that the caudal portion to be located again crosses over traheei.Portiunea thoracic mediastinum entire length with a length of about 20 mm. Abdominal portion of the laboratory mouse has a length of several mm are easily noticed in the abdominal cavity (fig. 1). Layered wall of the esophagus consists of mucosa, submucosa, muscular and serous start. Stratified epithelial lining shows a floor disposed on the basement membrane. This separates the chorion epithelium. Epithelium is cornificat. Esophageal submucosal glands is lacking. Muscle layer is formed on the entire length of skeletal muscle fibers.The mause esophagus has two layers of striated muscle (outer longitudinal and inner circular), which become smooth near the attachment point with the stomach. The esophagus is closed off from the stomach by the **gastroesophageal barrier**, which consists of the **crural sling**, the **lower esophageal sphincter**, and the several milimeters of intraabdominal esophagus that lie between them. Humans also have a crural sling and an esophageal sphincter, but ours are placed right on top of one another. In mause, they are separated by several millimeters of intraabdominal esophagus (fig 1).

The **esophageal sphincter** is a circular muscle that surrounds the base of the esophagus. At its lower edge, it has muscle fibers that insert into the limiting ridge (Fig 2). So when the sphincter contracts, it not only constricts the walls of the esophagus, it also pulls the sides of the limiting ridge's "U" together, thus hiding and tightly closing the esophageal opening

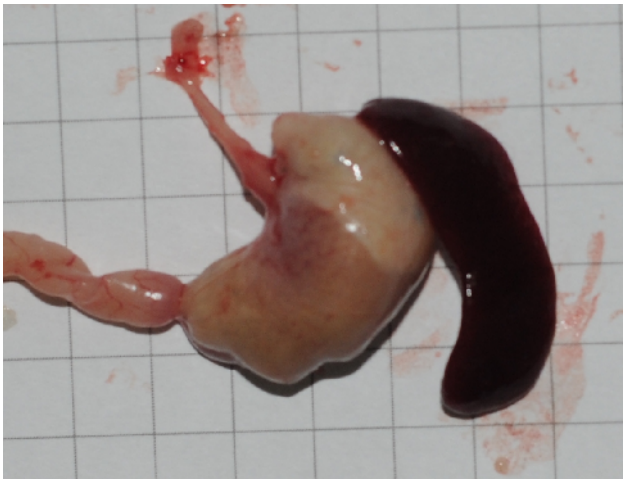

Figure 1- portion of the thoracic and abdominal esophagus in mouse

The mouse stomach is a stomach a one compartment type compound. Recurbat the shape of a bag-shaped "U". The stomach consisted of two distinct parts: the left part (non-glandular, proventriculus or forestomach) was greyish, thin-walled and slightlytransparent, non-glandular section that receives the esophagus and serves as a holding chamber for food, (Its walls are similar to those of the esophagus) and the right part (glandular or ventriculus) was white and thick-walled. (Fig. 1,2) The mucosa of the glandular (right) part was lined by simple columnar epithelium. The lamina propria was occupied by simple tubular, gastric glands. The cells of these glands were discernible in 3 distinct zones. The chief cells,showing intense basophilia, occupied the lower third region of the gland; the parietal cells were predominantly present in the upper half of the glandular tubule. A few of them appeared to be admixtured with the chief cells in the lower third of the gland. The neck cells were evident near the openings of the tubular portion of the gland at the gastric pits. The lamina muscularis mucosae was thin. The tela submucosa consisted of loose connective tissue with blood vessels. The tunica muscularis was thick, consisting of an inner spiral and an outer obliquely circular layer. Ganglion cells were present between these muscle layers. The tunica serosa was thin. The nonglandular (left) part of the stomach was lined by keratinized, stratified squamous epithelium. The stratum granulosum was distinctly visible. The thickness of the tunica muscularis decreased from the nonglandular to the glandular stomach.

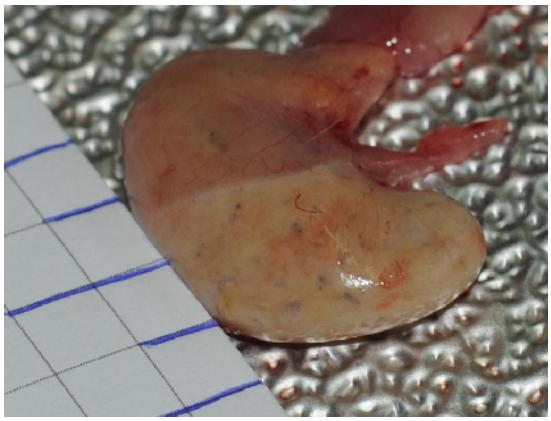

Figure 2 – External conformation of stomach

The forestomach and the corpus are separated by a low fold of tissue called the **limiting ridge** (*margo plicatus*). The limiting ridge extends circumferentially from the large curvature of the stomach to the small curvature, just below the esophagus. At the esophagus, the course of the limiting ridge bends into a U-shape and almost surrounds the esophageal opening (fig. 3).

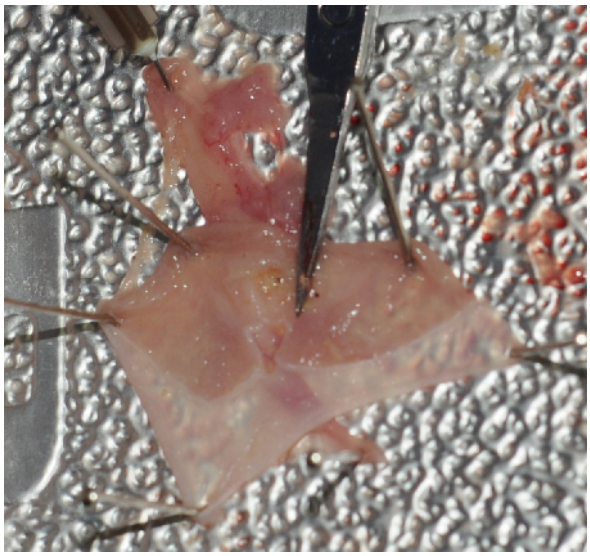

Figure 3 - limiting ridge (*margo plicatus*) and cardia orifice

Stomach in mice show the characteristic four compartment stomach tunics: mucosa, submucosa, muscular and serous.

On histological examination of gastric mucosa is found to continue occupying the esophageal mucosa type aglandulara portion of the stomach lining cardiale as being located in the middle of the stomach cavity to limit the glandular portion astomacului. The left bow portion notice a gas storage area resulting from digestion stomach, forming diverticula. In this area of the esophageal epithelium is further (fig 4). Epithelium cardiale area is soft layered

pavement type, consisting of basal layer, intermediate layer and a layer pavement (fig 5). Further stratified pavement epithelium soft cardial diverticula in the fold, the crossing is by simple prismatic epithelium stomach composed of secretory prismatic cells of the mucous type. Corion cardiei mucosal area is composed of connective fibers in the muscular lining is. Submucosa consists of connective tissue laxity and muscular skeletal muscle consists of fibers that are continuous muscular glandular region. Thus there is a double compartment stomach in mice which consists of a zone type aglandulara esophageal and glandular area (stomach itself). Boundary between two regions is the area that is narrow cardiale lining edge to form limiting ridge (*margo plicatus*).

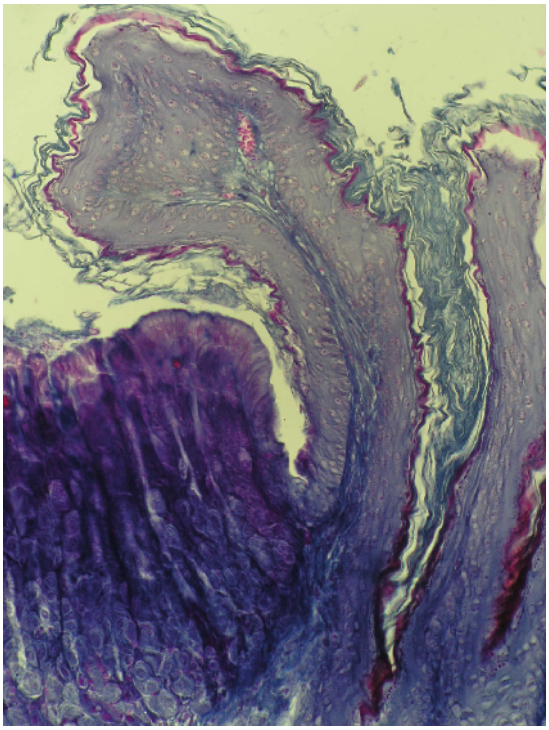

Fig. 4 - Mouse stomach - epithelial transition zone, Col. tricromică Mallory; Ob. 20x

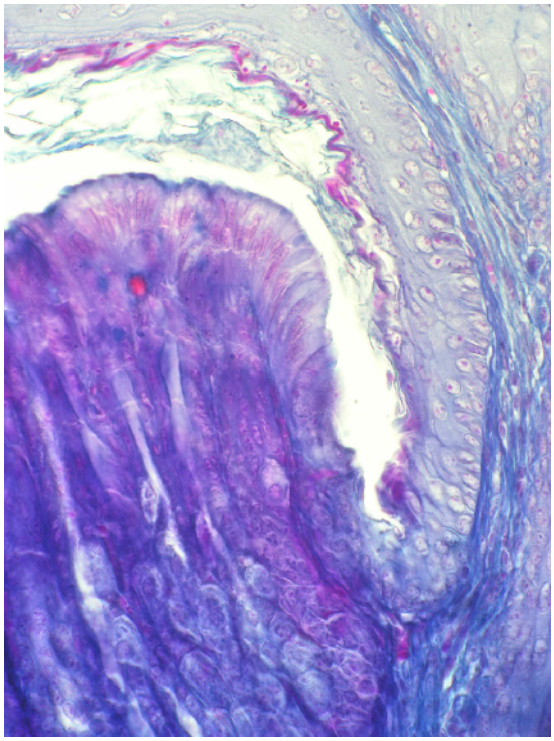

Fig. 5 – Mouse stomach - epithelial transition zone; Col. tricromică Mallory; Ob. 40x

Glandular mucosal area is characterized by the presence of a simple prismatic epithelium composed of epithelial cells with high basal pole located on the basal membrane, nuclei are located in the lower third and the apical pole contribute to mucosal surface.

Secretory epithelial cells are mucous cells of closed type, with a role in the development and elimination by merocrinie mucinous. Glandular stomach mucosa in the chorion, composed of connective tissue laxity, there are fibers and connective cells, blood and lymphatic vessels and nerve fibers. The thickness of the region corion background are obvious gastric glands with simple tubular part composed of basal cells, principal cells and marginal cells.

Muscularis level in the transition, it is composed of striated muscle fibers that are continuous longitudinal layer of smooth muscle fibers. The longitudinal layer of smooth muscle fibers are inserted through the connective fibers, skeletal muscle fibers from the

region cardiei. In this area, is the original type muscular and striated muscle is an area of transition from a striated muscular type by a smooth muscular type. (fig 6).

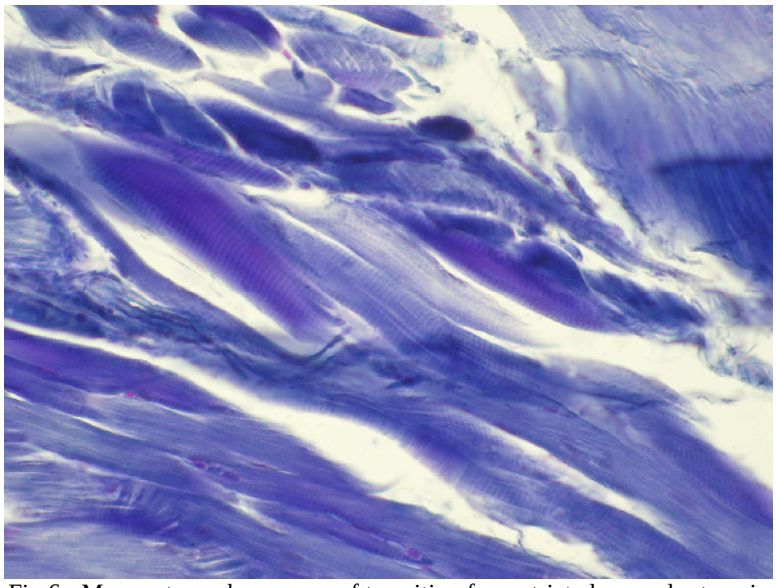

Fig.6 - Mouse stomach - an area of transition from striated muscular type in a smooth type; Col. tricromică Mallory; Ob. 40x

The section in Figure 3 can be seen crossing the zone presence of striated muscular type in the flat type, fiber type skeletal striated in longitudinal arrangement continues with a compact layer of smooth muscle fibers with longitudinal arrangement also.

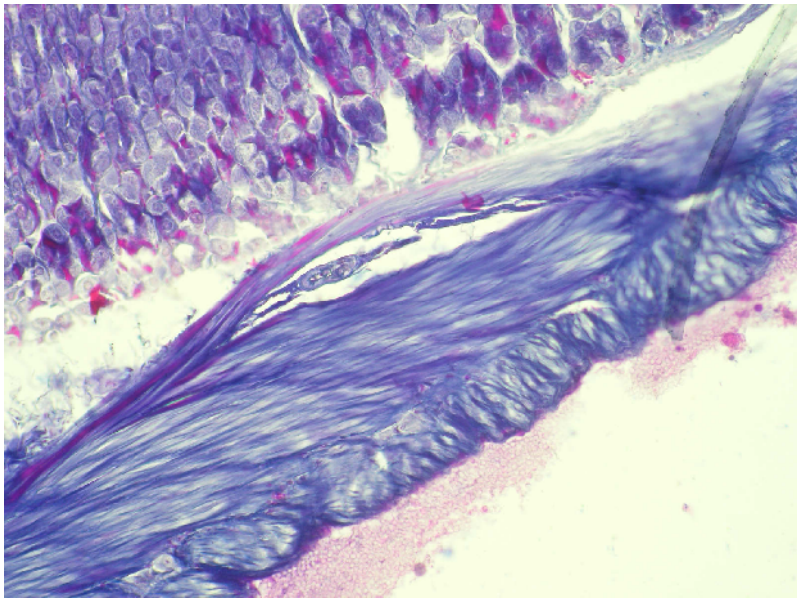

Fig. 7 - Mouse stomach - smooth muscular type in the glandular compartment; Col. tricromică Mallory; Ob. 20x

Muscular stomach, after more than cardiei area, is exclusively composed of smooth muscle fibers. In the right background and pyloric areas, muscled consists of smooth muscle

fibers arranged in two levels: internal circular and external longitudinal between the two plans are being muscular plexus Auerbach vegetation with a small amount of tissue laxity. (fig 7)

CONCLUSIONS

- Esophageal mucosal is cornificated. Esophageal submucosal glands is lacking.
- Muscle layer is formed on the entire length of skeletal muscle fibers
- At the esophagus, the course of the limiting ridge bends into a U-shape and almost surrounds the esophageal opening
- Esophageal submucosal glands is lacking
- Stomach shows a bottom region extends into the left dorsal diverticulum with a stomach that is part of the aglandular stomach portion
- Limit the portion of the stomach and aglandular portion is represented by limiting ridge
- Limiting ridge is in its structure in the right hole cardia skeletal muscle

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