Original article

Morphology of the canine omentum part 2: The omental bursa and its compartments materialized and explored by a novel technique

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4 Figures

1 Video

Summary

The canine omental bursa is a virtual cavity enclosed by the greater and lesser omentum. While previous representations of this bursa were always purely schematic, a novel casting technique was developed to depict the three-dimensional organization of the omental bursa more consistently. A self-expanding polyurethane-based foam was injected into the omental bursa through the omental foramen in 6 dogs. After curing and the subsequent maceration of the surrounded tissues, the obtained three-dimensional casts could clearly and in a reproducible way reveal the omental vestibule, its caudal recess and the three compartments of the splenic recess. The cast proved to be an invaluable study tool to identify the landmarks that define the enveloping omentum. In addition, the polyurethane material can easily be discerned on computed tomographic images. When the casting technique is preceded by vascular injections, the blood vessels that supply the omentum can be outlined as well.

Keywords: omental bursa – casting – dog - omentum – polyurethane

Introduction

The greater and the lesser omentum (Omentum majus resp. Omentum minus) are peritoneal folds that originate from the dorsal and ventral mesogastrium, respectively (Barone, 2009). The canine greater omentum is remarkably large and extends from the stomach to the urinary bladder, covering the intestinal coils ventrally and laterally. It can be subdivided into bursal, splenic and veil portions (Zietzschmann, 1939). Except for the latter, each omental portion is composed of two layers, a superficial wall (Paries superficialis) and a deep wall (Paries profundus), which enclose a virtual space indicated as omental bursa (Bursa omentalis) (Budras, 2002). The omental bursa is roughly the sum of (1) the omental vestibule

(Vestibulum bursae omentalis), which is enclosed by the lesser omentum, the stomach and the liver, (2) the caudal omental recess (Recessus caudalis omentalis) which is enclosed by the greater omentum, and (3) the splenic recess (Recessus lienalis) which extends at the left extremity of the omental bursa and is enclosed by the gastrophrenic, phrenicosplenic and gastrosplenic ligaments (Ligamentum gastrophrenicum, phrenicolienale and gastrolienale) (Habel, 2012).

Creative solutions are needed to gain accurate insights into the anatomical layout of the canine omentum. As a matter of fact, it is impossible to fully explore the omentum in its unaltered topographic organization within the abdominal cavity because the omentum is flaccid and its different portions are folded. In order to properly visualize and describe these portions, they need to be stretched and separated from each other (Dux, 1988). Earlier anatomical research on the canine omentum has been performed *ex vivo*. Zietzschmann (1939) provided schematic representations of the omental walls based on findings after the *in toto* excision of the omentum along with the adjacent abdominal organs. Additional anatomical schemes were provided by other authors in various handbooks (Ackerknecht,1943; Adams, 1986) (Fig 1). In an alternative approach in rodent cadavers, whipped egg white was successfully injected into the omental bursa in order to stretch and separate the delicate bursal walls (Dux, 1988). This renders the possibility to examine the omental vascular pattern or take histological samples of each omental wall separately. Given the far larger volume of the canine omental bursa compared to the murine model, a novel technique was developed to cast the virtual spaces enclosed by the canine omenta. Moreover, by materializing the bursa a hands-on omental study tool is created and vascular landmarks that define the different omental portions are visualized (for a full overview: see Part 1)

Material and Methods

Five fresh canine cadavers of different gender, age and breed were used (Table 1). All animals had been euthanized for reasons unrelated to this study. Each cadaver was placed in dorsal recumbency. The abdominal wall was incised in the ventral midline and the peritoneal cavity was opened from the xiphoid cartilage to the pecten of the pubic bone. The descending part of the duodenum was identified and pulled towards the midline, in order to uncover the omental foramen.

A polyurethane-based foam (PU-schuim©, Hubo, Wommelgem, Belgium) was used as casting material. It is a single component, self-expanding, high yield polyurethane-based foam, containing polymethylene polyphenyl isocyanate and a gaseous propellant. The foam is available in a pressurized aerosol can with a foam dispenser and a removable flexible cannula (diameter: 8 mm). The foam expands until counterpressure is met. When the prepolymer is expelled from the can, the foam reacts with ambient moisture and cures. According to the manufacturer, the time of complete curing depends on the level of humidity and ranges from 1 to 2 hours (between 5°C and 35°C).

The flexible cannula was placed into the omental foramen and was manually held in place. Subsequently, the air compressed can was connected to the cannula and the foam was ejected. After expulsion, solidification of the polymer began immediately, making the foam less malleable. Because of the fragility of the omentum, the injection pressure was kept as low and as constant as possible by moderating digital pressure on the dispenser. During the entire procedure the omentum was minimally manipulated to avoid tears and subsequent leakage of foam, and therefore only slight manual pressure was applied to assist the polyurethane spreading uniformly in the bursa. Since the foam is self-expanding and volume occupying, the closely huddled omental walls were separated by the polymer without manual aid. Injection was stopped when the foam was uniformly spread and visible in every bursal compartment. As soon as the solidification had proceeded to such an extent that the foam would no longer leak through the omental foramen (approximately 10 to 15 minutes), the cannula was removed. The cadavers were then left undisturbed overnight at room temperature. During the entire solidification period, further expansion of the polymer was observed. After complete curing of the foam, the cast of the omental bursa (enveloped by the different parts of the omentum) was first examined *in situ*. Leakages that had occurred, in spite of all precautions, could easily be recognized by the lack of smooth lining and by the absence of overlying tissue. In the rare occasion of leakage, the escaped polymer was cut off the cast. Subsequently the bursal cast together with the liver, stomach, greater and lesser omentum, spleen, small intestines and kidneys were excised as a whole and immersed in a solution of 25% potassium hydroxide (KOH). Weights were used to keep the cast submerged. After this maceration step the cast was immersed in a solution of 10% hydrogen peroxide (H_2O_2) in order to remove the last remnants of organic material, i.e., mostly fatty tissue of the omentum. In all cases the corrosion casts proved to be stable, hands-on study tools showing ample morphological details (Fig. 4).

In an additional dog, an older female Maltese dog (Table 1), omental casting was preceded by arterial injection of contrast loaded latex. This dog was put in dorsal recumbency and the thoracic cavity was opened through a rectangular window (approximately 6x4 cm) extending from the 4th to the 6th left intercostal space. A 20 Gauge intravenous catheter supplied with a 3-way stopcock was placed and secured into the thoracic aorta just caudal to the aortic arch. Immediately before injection, the latex (casting material) was mixed with a contrast agent (Ultravist© (Iopromide), Bayer) in a 5:1 ratio (30mL/150mL) to create sufficient radio-opacity for detection by means of CT imaging.

Once the vascular cast had been completed, the omental bursa was approached through a ventral midline abdominal incision that was extended paracostally to the right. After inserting the flexible cannula into the omental foramen, the abdominal incision was closed completely, apart from the exit opening of the cannula. Subsequently, the air compressed device was connected to the cannula and the foam was expelled until abdominal expansion became apparent. After 15 minutes the cannula was removed, the remaining abdominal opening was sutured and the cadaver was left undisturbed overnight to allow the polymer to cure. The next day, the dog was positioned in dorsal recumbency on the table of a 4 slice helical CT scanner (Lightspeed Qx/i, General Electric Medical Systems, Milwaukee, WI). Contiguous transverse 1.25 mm thick slices with an overlap of 0.6 mm were obtained from the mid-thoracic until the lumbosacral region, parallel to the intervertebral disc spaces. Settings for the CT procedure were 120 Kvp and 120 mA using a bone and soft tissue algorithm. Image matrix size was 512 x 512 and field of view was 25 cm. Image acquisition time was approximately 4 min.

The DICOM data were retrieved and loaded into the Amira 4.0.1 (Visage Imaging GmbH, Berlin, Germany) application (Casteleyn et al., 2010). The projections of the stomach, duodenum, spleen and arterial tree on every fifth section image were labeled manually with the brush and/or lasso tools in the segmentation editor. The sections in-between were subsequently labeled through the interpolation command (Cornillie et al., 2008). The grey-tone values of the vertebral column and bursal cast were adequately distinct to allow an automatic segmentation (Fig. 5). After CT imaging, the abdomen of the dog was opened and the bursal cast was examined *in situ*, macerated by following the same procedures as in the other dogs, and used to interpret the CT images.

Finally, to illustrate the three-dimensional topographic anatomy of the greater omentum in situ, the omentum of a fresh cadaver was filmed while being dissected via a ventral midline approach. The resulting video can be viewed by opening the following URL-link: www.UGent.be/canine-omentum.

Results

Omental bursa

In all dogs the greater omentum consisted of a bursal, a splenic and a veil portion. The former two portions clearly consisted of a superficial and deep wall. The omental bursa delineated by these two portions was successfully casted. In contrast, the veil portion consisted of a single sheet. Consequently, it did not participate in the formation of the bursa.

The casted omental bursae consistently demonstrated three recesses, i.e. the caudal omental recess (Recessus caudalis omentalis), the splenic recess (Recessus lienalis) and the omental vestibule (Vestibulum bursae omentalis). The folds of the superficial wall containing the arterial landmarks (see Part 1) clearly left impressions in the corrosion casts of the omental bursa in the form of deep clefts. These landmarks contributed to the demarcations of the aforementioned recesses and of additional compartments within the splenic recess (Fig 4, video). The splenic recess was indeed further subdivided into a cranial, a caudoventral and a caudodorsal compartment, which were enclosed by the homonymous parts of the splenic portion of the greater omentum. The cranial gastrosplenic fold set the border between the cranial and caudoventral compartments. The caudal gastrosplenic fold formed the border between the caudal omental recess and the splenic recess, whilst the caudal omental recess was evenly enveloped by the bursal portion of the greater omentum (Fig. 4, video).

The vestibule of the omental bursa was delineated ventrally by the lesser omentum, dorsally by the dorsal abdominal wall, caudally and bilaterally by the lesser curvature of the stomach and cranially by the liver. The papillary process of the caudate lobe of the liver protruded into the vestibule in all cases. The opening of the vestibule to the caudal omental recess (Aditus ad recessum caudalem) was delineated to the left by the gastropancreatic fold (Plica gastropancreatica) containing the left gastric artery, and to the right by the hepatopancreatic fold (Plica hepatopancreatica) containing the hepatic artery. Ventrally this opening was bordered by the lesser curvature of the stomach and dorsally by the left pancreatic lobe (See Part 1, Fig 3C).

Casting technique

Success of the casting technique highly depends on the condition of the cadaver. In one dog the bursal part of the greater omentum was found adhering to a thickened segment of the intestinal wall. At this spot the omentum was very fragile and tore by even the slightest manipulation while injecting the foam. In that particular dog only the splenic recess and the vestibule of the omental bursa were successfully casted. In another cadaver spontaneous tears arose locally while injecting the foam without any macroscopic identifiable reason.

Discussion

The fragile and malleable nature of the omentum demands a specific approach to univocally map its anatomical configuration. Traditionally, researchers took refuge in schematic representations (Fig 1). Dux et al. (1993) proposed a technique based on injections with chicken’s egg white into the omental bursa, to separate the superficial and deep walls of the greater omentum in rodents to sample the tissue without damaging. Although such an approach is not realistic in larger animals such as dogs, the idea to cast the omental bursa proved to be crucial in the creation of an omental study tool. By materializing this space, the landmarks that border the enveloping omental parts were much easier visualized.

In the splenic portion of the greater omentum, the impressions of the folds of the superficial wall invaginating and therefore compartmentalizing the omental bursa were clearly demonstrated in all bursal casts. As such, the polyurethane-based casting technique enabled us to conclusively visualize the different compartments of the splenic recess which to date, although already described and defined by Otto Zietzschmann in 1939, still have not found recognition in the current official nomenclature (N.A.V., 2012).

The omental bursa as a whole is typically defined as the virtual space enclosed by the greater and lesser omentum, the stomach and the liver (Evans, 1993; Habel, 2012). The spleen is not mentioned in these definitions as a bounding organ. However, in the present study, the spleen was clearly shown to occupy a substantial part of the left border of this space. With regard to its compartmentalization, the omental bursa is described in literature as being the sum of the vestibule of the omental bursa with a dorsal recess, the caudal omental recess and the splenic recess (Habel, 2012), although some authors do not differentiate between the caudal omental and splenic recesses and consider the latter as an integral part of the former (Könich and Liebich, 2004).

The vestibule of the omental bursa is the antechamber of the omental bursa (Zietzschmann, 1939; Evans, 1993). It is enclosed by the lesser omentum, the stomach and the liver (Könich and Liebich, 2004; Habel, 2012). In carnivores, like in ruminants, the papillary process of the liver projects into this cavity (Habel, 2012). The vestibule of the omental bursa is said to possess a minor dorsal diverticulum (Recessus dorsalis omentalis) bordered cranially by the right crus of the diaphragm, caudally by the liver, ventrally by the oesophagus and dorsally by the caudal vena cava (Habel, 2012), to the left by the gastrophrenic ligament (Lig. gastrophrenicum) and to the right by the coronary ligament (Lig. coronarium hepatis) (Barone, 2001). According to Evans (1993), however, this dorsal recess is bounded by the lesser omentum, the liver and the lesser curvature of the stomach, and by this definition the proper vestibule is therefore restricted to merely the antechamber of the omental bursa, from which a much larger dorsal recess radiates. We considered the vestibule following the first definition. All bursal casts in the present study included a vestibule in which the papillary process of the caudate lobe of the liver protruded. This compartment was delineated ventrally by the lesser omentum, dorsally by the abdominal wall, caudally and laterally by the lesser curvature of the stomach and cranially by the liver. However, in contrast to the former description, in none of the casts could the presence of a dorsal recess radiating from this compartment be identified. On the other hand, in a similar study on the morphology of the omental bursa in horses, a distinct dorsal recess was demonstrated in all 30 casts of the vestibule of the omental bursa (van Bergen et al., 2014).

The caudal omental recess has been defined by some authors as the cavity enclosed by the greater omentum (Barone, 2001; König and Liebich, 2004; Habel, 2012), whereas others restrict it to the cavity enclosed by the bursal portion (Evans, 1993). The former definition could be rather confusing since it implies that the splenic recess is a subcompartment of the caudal omental recess which, at least according to the Nomina Anatomica Veterinaria (N.A.V., 2012), should not be the case. We found a large compartment enclosed by the bursal portion of the greater omentum in all the casts. This caudal omental recess was bordered by the stomach, the pancreas, the spleen and the free borders of the greater omentum. The boundary between this compartment and the splenic recess in the superficial wall was formed by the caudal gastrosplenic fold (Plica gastrolienalis caudalis) (see Part 1, for description of this fold). This border was clearly discernible in all casts by the presence of a deep fissure caused by the protrusion of that fold. In the deep wall the boundary between the caudal and splenic recesses was formed by the splenic artery which left shallow but distinct imprints in all casts.

The splenic recess is defined as the left extension of the omental bursa enclosed by the gastrophrenic, gastrosplenic and phrenicosplenic ligaments (Lig. gastrophrenicum, Lig. gastrolienale and Lig. phrenicolienale, respectively) (Habel, 2012). Zietzschmann (1939) previously described this recess in detail, which he referred to as the Recessus (bursae omentalis) gastrolienalis communis. Our observations of the splenic recess are very similar to his descriptions, despite some topographical inconsistencies. Based on the *ex vivo* examination after an excision of the omentum together with the adjacent abdominal organs, Zietzschmann (1939) subdivided the splenic recess into a dorsal, lateral and medial splenic recess (Recessus lienalis dorsalis, lateralis and medialis, respectively). Similarly, in the present study, the splenic recess in all bursal casts could be subdivided into three compartments. However, these compartments were topographically situated cranially, caudoventrally and caudodorsally respectively (Fig. 4). According to Zietzschmann (1939) the dorsal compartment of the splenic recess was not consistently present. In the present study the cranial compartment was identified in all the casts, although it did greatly vary in size. The folds, which contain the arterial landmarks and delineate the omental parts and bursal compartments, corresponded to those described by Zietzschmann (1939).

As the single-sheeted veil portion of the greater omentum (Velum omentale) does not participate in the delineation of omental bursa, it left no remains in the produced casts. As such, the present study did not allow us to confirm the originally double-sheeted origin of this portion, of which the superficial and deep walls are believed to fuse during development (Barone, 2009; Zietzschmann, 1939).

As for the casting technique, the search for a suitable medium to cast the canine bursa needed to address two main issues, i.e., the large volume of the bursa and the fact that the omental walls are extremely flaccid and provide very little counterpressure. Casting media based on methacrylate or epoxy resins, as often applied in vascular corrosion casting, are less suitable for voluminous organs since they produce relatively heavy casts, which may show distortions due to their own weight. The lack of elasticity of these media also results in unwanted breaking of the material during the casting procedure or subsequent maceration and handling (Viggiano et al., 2003; Krucker et al., 2006). Silicone rubber and latex are more elastic materials, but they do not offer dimensional stability and are not corrosion resistant (Meyer et al., 2007). The polyurethane elastomer (PU4ii©, VasQTec), recently introduced for corrosion casting of blood vessels, has been reported to result in elastic casts that retain the original shape of the vascular trees (Krucker et al., 2006; Meyer et al., 2007), but is rather expensive. Moreover, all aforementioned products are only available as liquid casting media. Since the omental walls yield easily to pressure, liquids would collect in a pocket at the lowest point of the cavity and would not spread uniformly. Therefore, they do not have the most suitable physicochemical properties. On the other hand, polyurethane-based foam, which is available in aerosol cans and which is widely applied as insulation material has an ideal consistency. Moreover, the self-expanding qualities of this foam make it a suitable product to uniformly fill and cast larger volumes with thin, flexible and fragile walls. In addition, it ensures active filling of blind spaces. The casting technique with expanding polyurethane has previously been used successfully to cast the tracheal-bronchial tree, blood vessels and intestines (Viggiano et al., 2003; Casteleyn et al., 2009; De Sordi et al., 2014). The foam is hydrophobic and sticks to dry surfaces. Therefore, Viggiano et al. (2003) suggested to moisten the workbench and gloves as part of the casting procedure. However, in our study we found it unnecessary to take such preparatory measures since the foam was directly injected with the omentum still *in situ*, hence avoiding tissue desiccation or inadvertent contact of the foam with the equipment and tools. Furthermore, it turned out unnecessary to leave the cannula in place during the entire polymerization process to prevent reflux of the foam through the insertion place. During the casting of hollow organs with rigid walls such as bronchial trees or blood vessels, pressure may indeed build up excessively (Viggiano et al., 2003). However, the omentum is more flexible and the potential bursal space is voluminous. In addition, the gaseous component of the foam is most likely able to escape through pores in the omental lining, posing less problems with overpressure. Such microscopic pores have recently indeed been identified in the feline omentum (Owaki et al., 2013). In the present experiments, the cannula was only left in place until solidification started, but soon thereafter it was removed in order to be able to close the abdominal wall.

On no occasion was inconvenient leakage through the omental foramen encountered. Leakage, however, did occur when the correct placement of the flexible cannula into the omental foramen failed as experienced in preliminary studies in which a ventral midline approach was applied and direct view on the omental foramen was obscured (data not shown). To allow visual confirmation of the correct placement of the cannula, the internal organs were manually slightly shifted to the left to expose the omental foramen. However, in the dog used for the CT-study, it was opted to leave the internal organs as undisturbed as possible in order to minimize the deformation. Therefore, the ventral midline incision was extended paracostally to the right to directly approach the omental foramen. Subsequently, to prevent remnant free abdominal air negatively influencing the contrast on CT images, the abdominal incision was closed. Surprisingly, full abdominal exposure prior to CT imaging did not result in relevant loss of contrast. Presumably, the high abdominal pressure caused by the expanding foam had efficiently expelled the remaining free abdominal air through the suture line.

The foam kept expanding for hours after the injection. The degree to which the foam extended while curing, was not predictable. Therefore, it remains difficult to determine the optimal amount of foam to be injected. The injection was stopped as soon as the foam was visually spreading into the complete bursa or, in the case when the abdomen was closed, until abdominal expansion became clear. The subsequent expansion of the foam gave extra volume to the cast. The outer surface of the cast was sliceable after two hours, which was in accordance to the foam’s technical manual.

The fragility of the omental walls remains a particular bottleneck in the study of this organ. During the solidification process the foam quickly becomes sticky. Manual aid in spreading the foam without tearing the omentum can then be difficult. The omentum is strategically placed in the peritoneal cavity to adhere to injured areas (Ryan et al., 1971). In one dog, focal adhesions of the omentum to adjacent tissues, as a remnant of an old inflammatory process, were present, and at these locations the omentum seemed more prone to tears.

The proposed study tool for the canine omentum was further optimized by simultaneous identification of its vasculature. In a pilot study in which different techniques for casting the omental blood vessels were explored (unpublished data), the production of vascular corrosion casts of the omentum seemed to be extremely difficult. The omental fat in which the blood vessels are embedded had the tendency to saponify during maceration rather than dissolving. Moreover, separating the superficial and deep walls of the omentum in order to chart the proper vasculature of each wall in an acrylic resin cast, without damaging the cast, is impossible. The flexible (but not corrosion resistant) latex turned out to be a suitable polymer to study the omental vasculature. It was thought that the non-destructive separation of the omental walls in the described polyurethane technique could be an asset to the omental vasculature research. However, on *in situ* examination of omental bursal casts combined with latex filled blood vessels, the vasculature outline remained unintelligible because some major supplying vessels were engulfed by the expanding polyurethane and as such became embedded in the cast. This issue can be overcome by the use of CT techniques. Vascular contrast injections are a valuable tool for the topographic evaluation of the vascular tree on CT-images (Rivero et al., 2009). Injection of latex loaded with contrast medium into the aorta just prior to the foam injection into the omental bursa allowed assessment of the main arterial omental supply on the CT-images of the final casts. The CT scanning of the cast resulted in grey-tone values that could be discerned from values of other surrounding air and gas filled structures, allowing automatic labeling and precise three-dimensional reconstruction. Mapping smaller arteries in this setting was more difficult and not superior to *in situ* examination of the latex injected vessels without bursal casting.

Conclusion

The fragile and malleable nature of the omentum demands creative solutions for detailed morphological investigations. In the present study these challenges were faced by casting the omental bursa. One could argue that casting a virtual space can never provide a replica of the true *in situ* situation. However, the goal of this study was to develop a study tool and to challenge the traditional schematic representations of the omental walls. The cast remains an artificial representation and a distortion of reality, but this distortion was consistent. Furthermore, casting the omental bursa resulted in a hands-on, three-dimensional and reproducible study tool that showed anatomical landmarks that define the enveloping omentum. In addition, the reconstructed CT images proved to be an valuable tool to demonstrate the course of blood vessels that are engulfed by the foam.

The described technique has already successfully been adapted to cast and demonstrate the omental vestibule in horses (van Bergen et al., 2014) and further application of the technique might easily be extended towards morphological studies of many other virtual, expandable or fragile spaces such as the ovarian bursae, serosal cavities or fetal membranes, making it an interesting and promising anatomical study tool.

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Table 1: List of dogs and techniques used in the present study

Breed	Age group	Sex(F=female, M= male)	Implemented techniques
Jack Russell terrier	Young Adult	M	Polyurethane casting of the omental bursa
Golden Retriever	Adult-Geriatric	M neutered	Polyurethane casting of the omental bursa
American Stafford	Immature	M	Polyurethane casting of the omental bursa
Mongrel dog	Young Adult	F	Polyurethane casting of the omental bursa
Jack Russell terrier	Young Adult	M	Polyurethane casting of the omental bursa
Maltese dog	Adult-Geriatric	F	Polyurethane casting of the omental bursa + vascular casting with latex mixed with Iopromide (5:1) + CT
Rottweiler	Immature	F	Dissection+video

Legends to the figures

a. Stomach, b. Duodenum, c. Spleen, d. Liver, e. Pancreas, f. Left kidney, g. Bursal portion of the greater omentum (g' superficial wall, g" deep wall), h. Splenic portion of the greater omentum (h' superficial wall, h " deep wall), i. Veil portion of the greater omentum, j. Cranial gastrosplenic fold, k. Middle gastrosplenic fold, l. Caudal gastrosplenic fold, m. Lesser omentum, n. Dorsal mesogastrium, o. Ventral mesogastrium, p. Omental foramen, q. Vestibule of the omental bursa, r. Caudal recess of the omental bursa, s. Splenic recess of the omental bursa (s' cranial compartment, s" caudoventral compartment, s"' caudodorsal compartment), t. Cleft in the cast caused by the cranial gastrosplenic fold, u. Cleft in the cast caused by the middle gastrosplenic fold, v. Cleft in the cast caused by the caudal gastrosplenic fold, w. Impression in the cast left by the stomach, x. Impression in the cast left by the spleen, y. Impression in the cast left by the left kidney, z. Impression in the cast left by fatty streak

1. Cranial gastric branch of the gastrosplenic branch, 2. Left gastroepiploic artery

Fig 1. Classic schematic representations of the greater and lesser omentum and the omental bursa. Adapted from A: Zietzschmann (1939), dorsal view; B: Ackerknecht (1943), caudocranial view; C: Adams (1986), right lateral view.

Fig 2. A, B: Ventral view (top of the image = cranial) and C, D: left lateral view (right of the image = cranial) of a cast of the canine omental bursa of a dog in dorsal recumbency *in situ* (A, C) and image colored according to the schematic representations in figure 1 (B, D).

Fig. 3. A, B: Left lateral view (right border of the image = cranial, top border of the image = ventral) and C,D: ventral view of a polyurethane cast of a canine omental bursa after maceration in KOH and H_2O_2 (same cast as Fig 2 and 3). In the cast imprints of attached and surrounding organs such as the stomach, spleen and kidney are marked. The cranial, middle and caudal gastrosplenic folds caused deep fissures in the cast. In this particular case the left gastroepiploic artery gave origin to an additional arterial branch that supplied short gastric arteries and that was contained within a fold (v*) (C).The fatty streaks containing the proper omental vessels only caused shallow grooves.

Fig. 4. Three-dimensional reconstructions of CT images of a casted omental bursa and blood vessels, showing the stomach and duodenum, liver, spleen, arterial tree and the polyurethane cast. A-C: Ventral views (left side of the images = right) and D-F: left lateral views (top of the images = dorsal). The quadrangles indicate the dorsal (B) and sagittal plane (E), respectively, that result in the corresponding section planes (C and F, respectively). Notice that some vascular trunks that border different compartments of the omental bursa are engulfed by the expanded foam in some areas on the cast surface, while their course can be tracked in the section planes.