



Saphenoperitoneal shunting for canine ascites

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Ascites refers to accumulation of serous fluid in abdominal cavity. It may be a manifestation of a transudate or a modified transudate (Gelen and King 1992). Peritoneovenous shunt (PVS) plays a major role in the surgery of interectable ascites. A permanent peritoneal cavity drainage of ascitic fluid into the circulation based on positive pressure gradient between peritoneal cavity with ascites and central venous pressure is the principle of shunting. Several drainage systems have been developed over the course of time in human beings. Currently, system which permit active flow management (Denvers shunt) enabling to retain long term cumulative function, are optimal. The only disadvantage of this procedure is its high cost. Therefore, attention was paid for its modification using patients own resources as described by Valdeyar *et al.* (1999). Here, the long saphenous vein was used as a drainage system. One way ascites flow is ensured by a natural valve in the saphenous orifice.

The first sapheno-peritoneal shunt was performed in humans by Pang *et al.* (1992) from Singapore, and further published by Utkal *et al.* (2004). This is now performed as a pure biological shunt and has many potential advantages. Nagy *et al.* (2001) performed 267 peritoneovenous shunt operations with a peritoneo venous anastomosis that drains the ascitic fluid into the saphenous vein.

The present work was conducted on 6 clinical cases of refractory ascites in dogs of either sex irrespective of age and breed. In all the 6 animals which were having recurrent ascites, saphenoperitoneal shunting surgery was performed.

Surgical procedure (Sapheno-peritoneal shunting): The animals were subjected to xylazine-ketamine combination to induce general anaesthesia for surgical procedure in the present study. The animal was restrained in right lateral recumbancy with the right leg moving downward and

backward. The saphenous vein was located from its emergence running laterally from the stifle joint proximally to distally in oblique direction over the shaft of tibia fibula and turns medially at the level of hock joint. An oblique incision was given over the skin from most caudal aspect of the stifle joint and extended obliquely to the cranial aspect downward till just above the hock joint. The skin, fascia and subcutaneous tissue were reflected to expose the saphenous vein. The entire course of the vein was freed from the tendinous sheath of muscles and thereafter lifted over an artery forceps.

The bifurcation of saphenous vein at the level of hock joint to cranial and caudal branches was identified. The main saphenous vein was transfixed just below the level of hock joint and above the bifurcation on lateral aspect and severed above the ligature. All the tributaries were transected and cauterized. The distal severed end of the saphenous vein was lifted upward up to the level of caudal aspect of stifle joint. The most caudal aspect of the stifle joint was exposed and a subcutaneous tunnel was created by passing a straight artery forceps bluntly and obliquely upward to open in the most caudal part of the abdomen on the left side of inguinal region. The jaws of the artery forceps were opened lightly and moved in circular manner to create a uniform tunnel. The elevated point of the artery forceps bulging out on the caudal aspect of the abdomen close to the medial aspect of the thigh was palpated and a nick was made over the elevated point of the forceps.

A stab incision was given parallel to the thigh for about 3 to 4 cm. It was deepened through the aponeurotic part of the abdominal muscles to expose the peritoneum. An artery forceps was now introduced through the abdominal incision in the newly created subcutaneous tunnel up to the level of stifle joint. The distal cut end of the saphenous vein was grasped gently with the artery forceps and pulled through the tunnel up to the level of exposed peritoneum. The lumen of the cut end of the vein was exposed and 4 polygalactin 910 suture No. 4/0 were passed at 12, 3, 6 and 9 o'clock position. The threaded cut end of the vein was brought nearer to the peritoneum and on end of the thread at 12, 3 and 9 o'clock position were introduced through the peritoneum and both the ends were grasped with an artery forcep and lifted upward. The lumen of the vein at 6 o'clock

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Figs 1–3. 1. Exteriorization, ligation and excision of saphenous vein; 2. Distal lumen of saphenous vein with four diagonal sutures; 3. Anastomosis of saphenous vein to the peritoneum.

position suture was slightly elevated and a perforation was made in the peritoneum with the BP blade no 11.

One end of the suture at 6 o'clock position was pierced with needle through the visceral surface of the punctured peritoneum to emerge out at the parietal surface and tightened. Similarly, the other 3 sutures were also tightened one by one at 3, 9 and 12 o'clock position to make patency of peritoneal cavity with the saphenous vein. Then, 4 additional sutures in between the previous sutures were carefully tightened. Thus, the sapheno-peritoneal shunting was completed.

Antiseptic liquid (povidone iodine and metronidazole) was applied over the part and a hypodermic needle number 24 was introduced into the exposed part of the vein. A suction was created in a hypodermic syringe and a small amount of peritoneal fluid was withdrawn to assure the patency of the shunt. Three to four interrupted sutures were applied to approximate the fascia and subcutaneous tissue with vicryl and then after the skin was closed by using black braided silk No. 1 in interrupted manner. The exposed course of the saphenous vein at the lateral aspect from the stifle to the hock was painted with povidone and metronidazole solution and skin edges were approximated with a series of interrupted suture with black braided silk no.2 followed by bandaging. Routine antibiotic and supportive fluid therapy was given in all the cases.

Doppler sonographic examination on 15th, 30th and 60th postoperative day revealed negligible amount of free fluid in the peritoneal cavity of both, nondescript dog and a Pomeranian dog indicative of successful drainage through the shunt. Rest 3 animals died and inguinal hernia was observed in Labradore on postmortem examination.

Portal hypertension remains a major cause of ascites and cases do not respond to medicinal therapy, it gradually progress leading to refractory ascites. In such cases, when liver pathology is involved, role of surgery becomes questionable. Due to inability for the radical surgery during the present study, a palliative surgery sapheno peritoneal shunting was planned for the symptomatic relief as also suggested by others also (Utkal *et al.* 2004, Vizsy *et al.* 2005, Mohamed *et al.* 2011). The surgical technique of shunting was technically easy, effective, economical with minimum instrumentation and complications as also reported by others (Saleh *et al.* 2003, Vizsy *et al.* 2004, Vizsy *et al.* 2005, Thapa *et al.* 2006, Mohamed and

Abdulaziz 2006, Tokue *et al.* 2011, Mohamed *et al.* 2011).

The site of incision used was found to be the most suitable to expose sufficient length (approximately 14 cm) of saphenous vein. The anastomotic site was noticed very close to the inguinal area, thus required a careful dissection. Any accidental opening of the inguinal canal could have caused serious complication as observed in one animal of the present study as strangulated inguinal hernia. The procedure of anastomosis of saphenous vein to the peritoneum was satisfactory. The vicryl suture no. 4/0 was satisfactory to perform a leak proof anastomosis for the shunting.

In case 1 and 6 (Pomeranian), self mutilating injury at the site of shunting and disruption of skin suture were observed on second postoperative day. Suitable measures were initiated but the animal died on third post operative day. The pet owner refused for the postmortem examination of the animal, thus, the cause of death remained obscure. The visible injury was of skin depth while the inner muscle sutures were noticed intact. However, the injury might be in depth to cause probably the internal hemorrhage and may be the cause of death. In case 2, a marked swelling was noticed at the site of shunting on seventh postoperative day. The swelling was mild, soft to touch without any inflammatory signs. It was aspirated and blood tinged fluid was seen. Suitable treatment was given, however the animal collapsed on 11th postoperative day. Postmortem examination of the case revealed strangulated hernia of intestine. Development of inguinal hernia and strangulation of intestine may be attributed to the dissection and manipulation of inguinal ring in the vicinity of anastomosis site of saphenoperitoneal shunt. During the anastomosis of saphenous vein to peritoneum being the inguinal ring was very close to the shunt, the dissection and manipulation might have weakened the musculature which during postoperative period resulted to inguinal hernia.

SUMMARY

The study was conducted on 6 cases of refractory ascites and saphenoperitoneal shunting as palliative surgery for its management in dogs. The saphenoperitoneal shunting was performed by exposure and ligation of the saphenous vein from the level of hock to stifle joint and passing it through the subcutaneous tunnel created medially on thigh up to the caudal part of the abdomen into peritoneum. The shunt

was created by suturing the distal cut end of the saphenous vein to the caudal peritoneum to drain the ascetic fluid in the systemic circulation. The post operative color doppler imaging showed negligible amount of abdominal fluid indicative of successful shunting in the present study. The success rate of peritoneal shunting recorded was 50%, however other animals showed complications like strangulated inguinal hernia, self mutilating injury and infection leads to failure. On the basis of findings of the present study, it may be concluded that the saphenoperitoneal shunting may be an effective palliative surgery to manage the refractory ascites in dogs.

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