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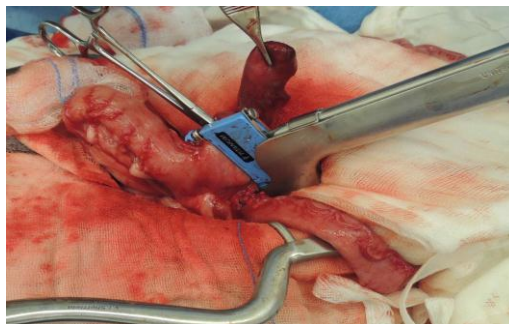
Soft Tissue Surgery Case Challenges for Advanced Practitioners Mini Series

Session 3: Advanced Gastrointestinal Surgery

Alison Moores BVSc (Hons) CertSAS DipECVS MRCVS
European and RCVS Specialist in Small Animal Surgery

Tips to Improve Intestinal Surgery

- If possible move small intestine out of the abdominal cavity so that intestinal surgery is performed over the drapes not the open abdomen, in case of spillage. It can be helpful to remove the retractors to allow this.
- Incise small segments of intestine at an angle and large segments at right angles to correct size disparity. This is especially important for small to large intestine anastomosis. For very large size disparity, it is easier to perform stapled anastomosis (see below).
- If there is size disparity due to dilatation of one segment due to a foreign body, and where these portions of intestine should be the same size, use the technique above but also consider slightly wider suture spacing on the larger segment and smaller spacing on the smaller segment. The lack of elasticity in the large segment and the elasticity in the small segment means that the anastomosis forms relatively well. Never partially close a dilated piece of small intestine to resolve size disparity as it may end up narrowed when it returns to its normal size.
- Check that you know what the submucosa looks like. It is a fine white line adjacent to mucosa and it feels tough when suture is engaging it. I only trim mucosa if its eversion prevents easy detection of the submucosa. Failure to engage submucosa is an important reason for suture line dehiscence as it is the suture-holding layer of the intestine. It can be difficult to see the submucosa at the mesenteric border as there is fat within the mesentery. I always place a couple of simple interrupted sutures here even if performing a simple continuous suture line, as it is a common site for leakage when I leak test, and placement of additional sutures can be difficult when the submucosa is not visible due to the tissues already having been opposed.
- I place sutures 3mm from the wound edge to ensure submucosa has been engaged. I place sutures 2-3mm apart to achieve the balance between a watertight seal and not placing too many sutures and therefore too many suture hoes.
- I never use suture of more than 1.5 metric. Larger suture has bulkier knots that are less secure, and larger needles will leave a larger defect in the intestinal wall. I choose PDS as it lasts longer than Monocryl. Having seen intestinal dehiscence at 7 days post-operatively, I am not comfortable with a rapidly absorbable suture material, although there is no evidence to suggest that PDS is better. Note: there are other alternatives to the Ethicon range of sutures.
- I leak test using saline and an orange needle. There are papers that report volumes of saline that equate to bursting strength. Note that any suture line will leak under very high pressure, so do not overfill the intestine. The aim is to identify any large leaks under moderate pressure than will need another suture to be placed.
- Simple continuous suture has been shown to be as strong as an interrupted suture, and its use has been advocated for intestinal surgery. However, it can be a difficult technique to do well, and I recommend that new graduates achieve a good competence of the simple interrupted before trying continuous. It can be hard to judge suture placement when there is size disparity and it is more likely that the end of the suture line at the antimesenteric border will have the two sides failing to line up, With an interrupted pattern this is less likely as sutures can be placed every 90 or 180 degrees to break up the suture line and make sure that sutures are appropriately spaced. This can be done with continuous suture as well.
- Continuous suture must be placed at the correct tightness. If it is too tight it may cut through serosa and possibly deeper layers. If it is too loose, it will be loose over a long length and it may be difficult to overcome this with additional sutures, meaning the suture line may need to be redone.

Stapled Functional End-to-End Anastomosis

Surgical stapling techniques have been described for resection and anastomosis of small or large intestine, as well as for anastomosis of small to large intestine. The main advantage over the sutured anastomosis is the ease in which intestine of different diameters can be anastomosed, for example when the oral portion is dilated after intestinal obstruction or when anastomosing small intestine to large intestine. Disadvantages are similar to sutured

anastomosis e.g. dehiscence, and regular staple units cannot be used in smaller diameter intestines e.g. in cats and small dogs. In these animals an endoscopic stapling device can be used, but these tend not to be kept in most practices due to costs. Cost may also limit the use of staplers, although this may be offset by reduced surgical times, especially where there is luminal disparity.

White RN. Modified functional end-to-end stapled intestinal anastomosis: technique and clinical results in 15 dogs. J Small Anim Pract. 2008 Jun;49(6):274-81.

Diagnosing Intestinal Surgery Dehiscence

Reported dehiscence rates after enterotomy and enterectomy were traditionally reported as 10-20%. A paper of foreign body removal in a first opinion practice (Hayes 2009) had much lower dehiscence rates and an abstract of dehiscence after intestinal biopsy had confirmed dehiscence in just 1% of cases. The major complication of intestinal surgery is septic peritonitis due to intestinal dehiscence. In dogs undergoing intestinal surgery, 2-16% suffered intestinal wound dehiscence. Risk factors after enterectomy and anastomosis include pre-operative peritonitis, low serum albumin or plasma protein concentration, and intraoperative hypotension. Intestinal foreign body was a risk factor in some studies. Dogs may be at greater risk of dehiscence than cats.

The first reported presenting sign of septic peritonitis is vomiting. Other clinical signs are usually more delayed and more vague, including increased depression, decreased appetite, pyrexia, and abdominal pain. However an owner may not notice these at home whereas vomiting is a sign they can look out for. An experienced veterinary nurse who is attentive to his/her patients can often pick up the subtle signs of deteriorating clinical signs prior to the onset of vomiting and it is important not to ignore any comments a nurse may make about a patient in their care. In my practice, the nurses have detected many of the septic peritonitis cases that have developed due to dehiscence.

If there is any suspicion for septic peritonitis it is important to analyse fluid cytologically. With a marked dehiscence there will be enough fluid to perform blind abdominocentesis, but ultrasound is very useful to find pockets of fluid. Not all septic fluid will look very grossly abnormal so cytology is important. However interpretation can be difficult as neutrophils are common following any laparotomy procedure. Studies have shown that absolute neutrophil count cannot be used to differentiate a postoperative abdomen to a septic peritonitis abdomen. In the latter however neutrophils will be degenerate and bacteria may be present. If there is doubt as to whether the fluid is septic and if the animal is just mildly depressed, I will retap the abdomen every few hours until I am confident that septic peritonitis has not developed. This is important as some cases I have seen do not have cytologically findings of septic peritonitis on the first tap but do on later taps – this may be because the leakage has just started and it hasn't been successfully tapped. If the animal deteriorates quicker I will retap sooner. If the clinical picture is very suggestive of septic peritonitis and I am suspicious for it but can't prove it, I might consider re-exploration. Certainly if septic peritonitis is confirmed then surgery is indicated.

The main differential for vomiting and depression after intestinal surgery is ileus. This can occur after any abdominal surgery, especially intestinal surgery. It can be differentiated from septic peritonitis on ultrasound, where in ileus the intestine will not be undergoing peristalsis, it may be dilated and abdominocentesis/cytology shows no infection.

Medical management of septic peritonitis prior to surgery

Management of the postoperative septic peritonitis case focuses on stabilizing the cardiovascular system sufficiently to allow anaesthesia. The main stay of treatment is:

- Fluid therapy
    - Bolus with crystalloids over 10-20 minutes. Assess response and if still hypovolaemia repeat boluses. When normovolaemia is achieved adjust fluid rates to a level that maintains it and may be 3-5 x maintenance.
    - Colloids and blood products are not usually needed in the initial period of stabilisation.
    - Consider human albumin if albumin levels are low. This is especially common if it is a second or third episode of septic peritonitis.
    - Be prepared to pharmacologically assist hypotension.
- Antibiotics
    - Broad-spectrum bactericidal intravenous antibiotic e.g. potentiated amoxicillin (Augmentin) or cefuroxime (Zinacef). Note surgical doses of 20mg/kg are higher than those given in the formulary.
    - Consider metronidazole and fluoroquinolones.
- Analgesia
    - Opioids can be given as concerns about respiratory depression are outweighed by the reduced dose of anaesthetic induction agent needed and inhaled gases. I use methadone 0.2-0.3mg/kg.
    - Avoid use of NSAIDs due to hypovolaemia.

Surgical Treatment of Intestinal Dehiscence

Usually the intestinal wall is very inflamed. It can be hard to determine if sutures have failed or pulled through, but most seem to have pulled through. Suture line dehiscence is usually quite long rather than at a focal area. If there is a small area of dehiscence, if the intestine looks healthy and able to hold sutures, and if I am confident the other sutures are well placed, I will consider resuturing the enterotomy or enterectomy. Unfortunately, usually I find that the tissue is very unhealthy and will not support the placement of additional sutures without the tissue tearing. In these cases I will perform enterectomy and anastomosis. Extreme care must be taken for good suture placement, as septic peritonitis is a risk factor for dehiscence, so there is little margin for error.

The abdomen must be thoroughly lavaged and suctioned, using large volumes of fluid (5-10 litres). It is rare to not be able to completely remove all of the contamination; therefore open peritoneal drainage is not often necessary. It is a difficult procedure to manage postoperatively as patients need close monitoring, must have daily bandage changes and a return to surgery to close the abdomen, and they tend to suffer from hypoalbuminaemia and low electrolytes due to fluid loss from the abdomen. Active suction drains have previously been advocated and have been described again in the literature. I have found them very useful for being able to take fluid samples to check septic peritonitis is not developing again. It is also useful to be able to lavage the abdomen via the drain (as one would lavage a thoracic cavity for treating pyothorax).

Adams RJ, Doyle RS, Bray JP, Burton CA. Closed suction drainage for treatment of septic peritonitis of confirmed gastrointestinal origin in 20 dogs. Vet Surg. 2014 Oct;43(7):843-51.

Linear Foreign body

Linear foreign bodies occur due to ingested long foreign material. Cats are more likely to ingest thin material, which tends to anchor under the tongue (63%), while dogs often eat wide linear foreign bodies of which 67-78% of foreign bodies anchor at the pyloric antrum. Due to the anchored site, the intestine becomes bunched up around the foreign material when peristalsis occurs. The length of intestine involved reflects the length of the foreign body and the time since ingestion. Radiographic and ultrasonographic findings include intestinal

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plication and tapered gas bubbles. I find radiographs can be difficult to diagnose, whereas a good ultrasonographer should be able to find a linear foreign body. Pathophysiological consequences include partial or complete intestinal obstruction, perforation (often multiple) along the mesenteric border of the small intestine and adhesions.

The foreign body is removed via gastrotomy and as many enterotomy procedures as necessary. The more firmly embedded the FB is in the intestinal mucosa, and the longer the length of intestine involved, the more incisions are typically required to remove it.

If there is a large foreign body that is easily palpable in the stomach and intestine, then I am happy to perform gastrotomy, cut the foreign body, and remove the gastric portion. When the foreign body is cut in the stomach to separate the gastric and intestinal parts, the plication of intestines over the foreign body will reduce, and the intestine may return to its normal length without plication. If there were a large foreign body, it would not be difficult to find it even when plication is not present, merely by palpation of the intestines.

Conversely it is very difficult to find thin cotton or other foreign material if plication is not present. In this situation cutting a piece of cotton thread from under the tongue or removing foreign material from the stomach is not recommended, as it may then not be possible to find foreign material in intestine, especially if it is embedded in mucosa. It is important to perform an enterotomy first to find the foreign material and to keep hold of it e.g. with mosquito forceps. If it can't be found but it is palpable, remember that it could be imbedded in mucosa on the mesenteric surface. Once the thread is found within the intestine, the thread can be cut, by gastronomy if needed. Clearly in this example, there will be intestine and stomach open at the same time. Careful consideration must be given as to how to manage abdominal contamination; an assistant is invaluable.

If the foreign body is easily removed from the enterotomy half way along the length of plication, then a single enterotomy is all that is needed (+/- gastrotomy is there is a large gastric component). However it is important not to pull on linear foreign bodes as it can induce tearing along the mesenteric border. Instead I make additional enterotomies, find the thread and clamp with a mosquito before cutting the thread in half at the first enterotomy wound. I typically need no more than three enterotomy sites.

After plication, the intestsines may be normal or they may be damage on the mesenteric border. Repair of small defects can be performed as long as the tissue is sufficiently healthy to hold a few sutures. Sometimes it becomes apparent that there are multiple holes in the affected portion of intestine. The nature of intestine being plicated is such that leaking is rarely observed until the liner foreign body is removed, the intestines stop being plicated and material leaks out. Enterectomy is required for large areas of perforation, or adhesions that leave the small intestines plicated even after foreign body removal (the latter is very rare). I would start the enterectomy in the region of intestinal perforation and aim to remove all damaged tissue. However it can become apparent that there is a large longitudinal defect on the mesenteric side through the mucosa and more importantly through the submucosa, where the foreign body has cheese-wired though the intestine over a significant length. It is difficult to close this primarily (imagine an enterectomy with a partial thickness enterotomy coming from one end. It is impossible to perform an anastomosis with the submucosa not being intact adjacent to the enterectomy site. In this situation more intestine has to be removed until there is no more defect visible through the submucosa, however this may not be anatomically possible. In rare instances, I have had to euthanase animals where the entire proximal duodenum has been damaged and where resection is not an option.

The prognosis is good for cats with no complications and perforation in cats is uncommon. Dogs have a worse prognosis, and in one study >30% had suffered perforation and >40% required resection.

Challenging Perineal Hernia/Rupture Cases

There is an association between testosterone and perineal rupture formation. Given the higher castration rate in the UK than in the continent, we see a smaller population of dogs with perineal rupture formation and my impression is that there are not many dogs severely affected enough to need laparotomy as a first line treatment for managing ruptures.

The paper that suggested an association between intact males and perineal ruptures noted that recurrence of rupture was more likely in dogs that were not castrated, although case numbers were very small. Histology and EMG of levator ani muscle showed that it undergoes neurogenic atrophy in some dogs with perineal rupture. It has been suggested that this has been related to higher relaxin receptor expression in perineal muscles. A paper describes caudal scrotal castration to avoid the need to reposition the dog for prescrotal castration.

Snell WL, Orsher RJ, Larenza-Menzies MP, Popovitch CA. Comparison of caudal and pre-scrotal castration for management of perineal hernia in dogs between 2004 and 2014. N Z Vet J. 2015 Sep;63(5):272-5.

Perineal rupture repair using internal obturator (IO) flap was initially evaluated in 100 dogs, and other papers have been subsequently written. The wound infection rate was high in the original paper (45%). Another study of perineal rupture repair had 35% incisional complications (Hosgood) while that of Brissot had 17% wound complication rate. Higher infection rates can be expected in dogs undergoing perineal surgery due to the proximity of the wound to the rectum. I use perioperative antibiotics followed by a week of oral antibiotics. I also routinely close the wound with subdermal sutures and glue (Dermabond, Ethicon) to create a waterproof seal to reduce contamination of the wound and hopefully to reduce infection rates. It may be that infection rates are lower than this paper of nearly 30 years ago, but they must be considered. Part of my discussion of risks and complications is infection, as a deep wound infection will result in a perianal abscess. These are very painful and the cases I have treated have required daily anaesthesia/sedation (as they are too painful to examine conscious) for wound lavage. I treat these abscesses as with any open wound with lavage and debridement daily until the wound can be resutured or left to heal by second intention. A swab is taken for culture and sensitivity to guide antibiotic choice.

Some surgeons still advocate reconstructive surgery without IO flap but I always consider it as a standard part of the surgery. If lucky, the coccygeus/levator ani muscles will be identifiable and sutures can be placed in or through them. However if you do other surgery in this area or postmortem studies, you will note that the muscles of the pelvic diaphragm are normally very well developed and even the 'best' examples of the muscles on a perineal rupture case are much smaller than normal. I routinely pass a suture around the sacrotuberous ligament as the muscles are often not strong enough alone to hold sutures between them and the external anal sphincter muscle, or to give enough perineal support to avoid recurrence. Furthermore, if the rupture is between the muscles and the sacrotuberous ligament, then the latter must be included to close the rupture. The sciatic nerve is in close proximity to the ligament so the needle must pass immediately adjacent to it to avoid nerve impingement.

Sjollema BE, van Sluijs FJ. Perineal hernia repair in the dog by transposition of the internal obturator muscle. II. Complications and results in 100 patients. Vet Q. 1989 Jan;11(1):18-23.

Hosgood G, Hedlund CS, Pechman RD, Dean PW. Perineal herniorrhaphy: perioperative data from 100 dogs. J Am Anim Hosp Assoc. 1995 Jul-Aug;31(4):331-42.

Shaughnessy M, Monnet E. Internal obturator muscle transposition for treatment of perineal hernia in dogs: 34 cases (1998-2012). J Am Vet Med Assoc. 2015 Feb 1;246(3):321-6.

Occasionally bladder retroflexion into the rupture will occur. The paper by Hosgood noted this in 20 of 100 dogs. My personal experience is that it is much less frequent – I have seen 3 cases in 15 years. Alternatively there can be caudal displacement of the bladder without retroflexion, but this is less likely to cause complete urinary tract obstruction. Presenting

complaints may differ. At the extreme end of the spectrum, there will be complete obstruction of the urethra where it has kinked when the bladder retroflexes caudally. The animal will present with dysuria. In these cases, there will be a very marked perineal swelling that will be much bigger than previously noted. It will be much more fluctuant than typical perineal herniation and the bladder may be palpable per rectum within the perineum. If aspiration is performed, it will look grossly like urine, and as always with urine it can be verified by comparing the creatinine with serum creatinine. If it is drained completely it will refill, assuming the ureters are not also obstructed. An alternative to aspiration is to use imaging. On ultrasound a fluid filled structure will be visible in the perineum and no bladder will be present in the abdomen. Note that perineal ultrasonography requires a level of skill. A positive contrast retrograde urethrogram will identify the perineal location of the bladder and may document the kinking that has led to obstruction. It is usually possible to place a urinary catheter past the kinked portion of urethra so that the balloon sits within the bladder in its perineal location. This allows for patient stabilization and potential referral prior to surgery.

Whilst the original problem is perineal herniation, repositioning the bladder becomes the primary goal. As well as an abdominal approach, I clip the ventral pelvis and perform full perineal clip. The dog's pelvis is elevated on sandbags such that a combined abdominal approach and perineal approach can be performed if necessary. This will be needed if the bladder has been entrapped within the rupture for a period of time, as bladder adhesions to the perineal tissues will prevent it from being reduced via an abdominal approach alone. The abdomen is harder to access with the pelvis elevated as the dog is essentially curled up ventrally, and if I successfully reduce the bladder, I have an assistant remove the sandbags so that the dog is flat. Typically I wouldn't perform rupture repair at the same time as this surgery, but if I did, I would turn the animal into ventral recumbancy as the rupture repair will be much easier to perform than from dorsal recumbancy.

Cystopexy is performed to the right abdominal wall, as the colopexy is performed on the left side. It can be combined with a cystostomy tube if there is any concern that the animals can't urinate or that they may be urethral damage, although I would normally just performed cystopexy alone with no tube. I suture the bladder to the abdominal wall without incision of the bladder wall, as it will be too thin to perform incisional pexy as can be performed in the intestines.

Vas deferens pexy has been described for bladder and prostate displacement into perineal ruptures. However, I prefer cystopexy, as the nature of some of the displacements I have seen is such that the bladder folds ventrally on itself at the trigone, so that the bladder apex is facing caudally. In these cases I would not have the confidence that vas deferens pexy would be sufficient to stop recurrence of displacement, and of course it is not an option in females.

A study of 41 dogs with complicated perineal ruptures (defined as recurrence, unilateral rupture with a major rectal dilatation, rupture with a concurrent surgical prostatic disease, and rupture with retroflexed bladder) treated the dogs with abdominal surgery first to pexy bladder and/or colon as needed, followed by definitive repair of the perineal rupture 2-20 days latter. The aim of the colopexy is to reduce rectal dilatation. In this instance the colopexy is not being used to treat rectal prolapse but may reduce the likelihood of propalse occurring after surgery, as well as making it more likely that the dog will be able to pass faeces after colopexy. Despite these procedures, nearly half of dogs were still faecally straining after their definitive rupture surgery and in 10% it was long-term. Similarly a third were urinary incontinent in the short term and 17% long-term.

Gilley RS, Caywood DD, Lulich JP, Bowersox TS Treatment with a combined cystopexy-colopexy for dysuria and rectal prolapse after bilateral perineal herniorrhaphy in a dog. J Am Vet Med Assoc. 2003 Jun 15;222(12):1717-21, 1706.

Brissot HN, Dupré GP, Bouvy BM. Use of laparotomy in a staged approach for resolution of bilateral or complicated perineal hernia in 41 dogs. Vet Surg.2004 Jul-Aug;33(4):412-21.

Occasionally dogs suffer rectal prolapse after perineal rupture repair. My experience is also much lower than that noted by Hosgood, where it occurred in 9 of 100 dogs. I have not seen a case of rectal prolapse after perineal rupture surgery in the last 5 years. Some surgeons are concerned that it is more likely after bilateral repair, and therefore stage their repairs in dogs with bilateral disease. I have been doing bilateral repairs routinely for 15 years and have only seen a small number of dogs that suffered prolapse, so I do not think staging is necessary. Bilateral surgery will obviously be cheaper than staged procedures and doesn't seem to be more uncomfortable. It may be that prolapse is more likely to occur in dogs with large long-standing ruptures where there is marked deviation of the rectum, but many dogs with severe herniation do not have prolapse. I treat rectal prolapse as with any other cause of prolapse, by placing a purse string suture for 2-3 days. Local anaesthetic enemas (delivered in lubricating jelly via a urinary catheter) can reduce straining. If recurrence occurs it may be helpful to use an epidural catheter to administer epidural for a few days, but this is technically difficult. If a dog has recurrent rectal prolapse despite several attempts at purse string sutures, I perform colopexy.

To perform colopexy, I pull the colon cranially to reduce the length of colon and rectum available for prolapse. I pull just cranial to the pubic brim, rather than more cranially in the abdomen, so that the pull is exerted over a smaller length of colon and it will be more effective. Obviously it is important to be gentle enough not to damage or tear the colon. The colopexy is performed on the left side of the abdomen, as the colon is on the left. It has been reported that outcomes will be the same if the colon is sutured to the abdominal wall after scarifying the two surfaces (colonic wall, abdominal wall) or after incising them. I prefer the latter as I am confident that I can make a seromuscular incision without entering the mucosa, and the technique is similar to incisional gastropexy. I also choose this technique in the hope that it is stronger and less likely for the colopexy to fail, although there is no evidence to suggest this will happen. In the report below there were no recurrences in any of the cases, regardless of techniques. As for gastropexy, a 3cm colopexy performed with PDS is sufficient. I use a simple continuous suture placed in the dorsal edge first followed by the ventral edge, otherwise it would not be possible to suture the dorsal edge if it were attempted after the ventral edge has already been sutured. It is important that sutures don't penetrate the mucosa as this could lead to colopexy infection.
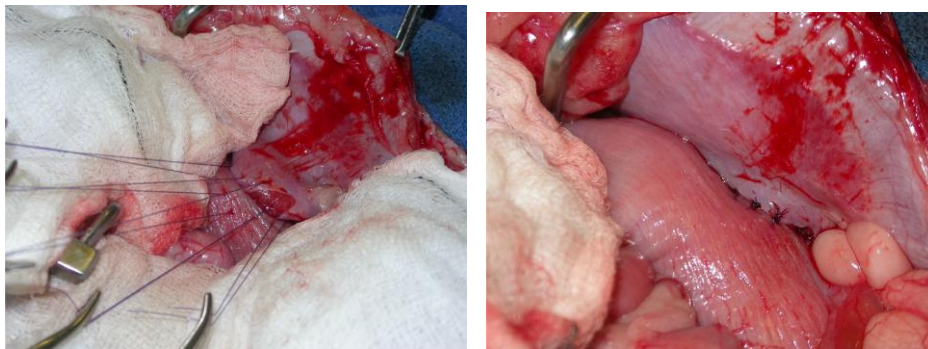
Popovitch CA, Holt D, Bright R. Colopexy as a treatment for rectal prolapse in dogs and cats: a retrospective study of 14 cases. Vet Surg. 1994 Mar-Apr;23(2):115-8.

Failure of perineal rupture occurs in 10-30% cases after IO flap and the other methods described below. Not all of these will result in clinical signs that are noticed by the owner and recurrence may occur a year after surgery. Some reports showed that some dogs were normal at one month follow up but had recurrence at long-term follow up, so care must be taken in interpreting papers that have short term follow up only. Tenesmus was a risk factor for the development of recurrence after treatment of perineal hernia.

There are a number of different procedures that have been suggested as an alternative to IO flap. I would use these as surgical choice for recurrences rather than my routine first surgery, as they all take longer to perform than the IO flap and yet also have a similar risk of recurrence to the IO flap. I do not use meshes for perineal rupture repair, given the high incisional complication rates and infection rates of IO flap surgery, although the paper on

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mesh repair of ruptures had just a 5% infection rate. Reported autogenous reinforcements are the fascia lata graft, porcine SIS[TM], autologous tunica vaginalis communis, and semitendinosus flap. I have found the semitendinosus flap very useful for recurrent ruptures, which tend to be large, or for dogs with large ventral ruptures. In the latter the IO flap alone will not close the defect. The surgery is very prolonged and has some complications including very mild lameness, and disappointingly is still associated with long-term recurrence. The semitendinosus muscle has a blood vessel at each end, meaning it can be transected either proximally or distally and still survive along its entire length. For perineal rupture the distal blood vessels are transected near the stifle joint and the muscle is rotated on its proximal pedicle. I typically use the contralateral muscle to the side with the largest defect so that the muscle is just transposed by 90 degrees, initially along the ventral aspect of the rectum, before it is rotated dorsally into the lateral defect. By doing this it is useful for filling in large ventral defects that would be hard to close by other methods. With very severe lateral and ventral ruptures, it is probable that bilateral staged muscle flaps will be needed.

Szabo S, Wilkens B, Radasch RM. Use of polypropylene mesh in addition to internal obturator transposition: a review of 59 cases (2000-2004). J Am Anim Hosp Assoc. 2007 May-Jun;43(3):136-42.

Morello E, Martano M, Zabarino S, Piras LA, Nicoli S, Bussadori R, Buracco P. Modified semitendinosus muscle transposition to repair ventral perineal hernia in 14 dogs. J Small Anim Pract. 2015 Jun;56(6):370-6.

Anal Sac Apocrine Gland Adenocarcinoma

Anal sac apocrine gland adenocarcinoma is usually a unilateral disease. It is occasionally seen bilaterally so careful anal sac palpation must be performed under anesthesia and the second anal sac is removed if a mass is felt. I would be nervous about trusting a negative aspirate in a very small mass where aspiration has been difficult to achieve, and by removing the anal sac histology can be performed. Bilateral disease seems rare enough that I wouldn't routinely perform bilateral anal sacculectomy if a mass isn't palpable.

Some dogs will have paraneoplastic hypercalcaemia, due to production of parathyroid-hormone-related peptide (PTH-rp). There are differing reports as to whether hypercalcaemia is related to survival, but many dogs with hypercalcaemia will present with small primary tumours, as the clinical signs of hypercalcaemia are evident before the mass is. If a primary mass secretes PTH-rp then typically metastatic tumours will do so too, so clinical signs of hypercalcaemia will recur.

Given the location, it is not possible to remove anal sac tumours with a margin of normal tissue around them. However, dogs often die of metastatic disease rather than tumour recurrence and survival was not affected by completeness of excision of a primary tumour in one study (Potenas and others). Surgery can be difficult for larger tumours, as space is limited. It is important that control of haemorrhage is undertaken, as bleeding vessels cranial to the mass cannot be reached until the tumour is largely dissected. Therefore sharp dissection deep to the mass should not be performed, and the tumour should be gradually removed by blunt dissection and diathermy/vessel sealing. With large tumours, dissection may approach the pudendal vessels, which will bleed profusely if transected.

It is rare for tumours to involve the rectal wall. If they do, this tissue will also need to be removed and the rectal wall sutured close. If there is a large defect it is closed transversely rather than longitudinally to prevent narrowing. However transverse repairs may be at increased risk of stricture formation.

It is important not to overlook metastatic disease. Whilst in many other tumour types, metastatic disease often negates removing the primary tumour, for anal sac apocrine gland adenocarcinoma it is important to consider lymphadenectomy for lymph node metastasis. There is a paper that reports similar survival in dogs with metastatic disease undergoing lymphadenectomy (sometimes multiple times as new lymph nodes become enlarged) as dogs without metastatic disease, although in the former group there were less than ten dogs, so

the data is not robust. However other papers have shown that both the sublumbar lymphadenopathy and lymph node extirpation were negative prognostic factors for survival.

Potanas CP, Padgett S, Gamblin RM. Surgical excision of anal sac apocrine gland adenocarcinomas with and without adjunctive chemotherapy in dogs: 42 cases (2005-2011). J Am Vet Med Assoc. 2015 Apr 15;246(8):877-84.

Hobson HP, Brown MR, Rogers KS. Surgery of metastatic anal sac adenocarcinoma in five dogs. Vet Surg. 2006 Apr;35(3):267-70.

I start the assessment with abdominal and rectal palpation. Large masses can be felt either in the caudal abdomen or in the pelvis on rectal examination. Radiographs will detect very large lymph nodes due to ventral displacement of the colon, but ultrasound or CT are more accurate. Very small nodes can't be easily aspirated due to the depth within the abdomen and the close proximity to the internal iliac vessels leading to a risk of haemorrhage. Should nodes be only slightly enlarged I would plan removal of the primary tumour with a view to repeat ultrasound to see if nodes are increasing in size, in which case they can be aspirated or removed. Most node enlargement is those just cranial to the pubic brim, but the chain of draining lymph nodes is throughout the pelvic canal and so rectal examination must be employed. It has been shown that MRI is more sensitive than US for determining lymphadenopathy, as US cannot fully assess the sacral nodes. CT would be an acceptable alternative and is much cheaper and quicker to perform than MRI.

Lymphadenectomy is performed by laparotomy. A long laparotomy incision is needed for exposure of the nodes, as they are deep and the proximity to the pelvis means they cannot be accessed through a small incision. The nodes are typically located at the trifurcation of the aorta and will be in very close proximity and may even be adherent to them. Dissection must be careful and meticulous to avoid arterial laceration. If nodes are encompassing arterial structures, ureters etc., they cannot safely be removed, but they can potentially debulked. This can sometimes be achieved by incising the capsule of the node and removing the contents by suction. Treatment of progressive disease (which may include repeat surgery, radiation and chemotherapy) will prolong survival.

For nodes within the pelvis that cannot be accessed by laparotomy, the only other surgical approach is pubic symphisiotomy. This is a difficult surgery to achieve and for the dog to recover from. An alternative is radiation therapy, which will be palliative.

We typically administer chemotherapy, although the benefit of adjuvant chemotherapy has not been determined. Radiotherapy is also considered beneficial to primary tumours.

Wouda RM, Borrego J, Keuler NS, Stein T. Evaluation of adjuvant carboplatin chemotherapy in the management of surgically excised anal sac apocrine gland adenocarcinoma in dogs. Vet Comp Oncol. 2016 Mar;14(1):67-80.

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