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Surgical nursing – mastectomy

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ABSTRACT: Surgical nursing roles include anaesthetist, surgical assistant and circulating nurse. Managing theatre is often the job of the veterinary nurse and successful management of these roles are vital for patient care and good surgical outcome. The nursing management of a dog with mammary tumours admitted for a second mastectomy is discussed. Pre-operative nursing interventions including blood testing, radiographs and intravenous fluid therapy is discussed, as are pre-anaesthetic clipping and the risk of surgical site infection (SSI). SSIs are also discussed in relation to surgical attire and despite a lack of evidence for some items reducing SSIs, they are still recommended to prompt theatre discipline. The nurse's role as a surgical assistant is discussed and the importance of good technique to ensure tissue vitality and reduced SSIs. Passive drain care is considered alone with the associated risks of ascending infection.

Keywords: surgical mammary mastectomy

Introduction

Signalment

Roxy, 9-year-old neutered female, cocker spaniel, weighing 15 kg.

History and presentation

Roxy presented with a subcutaneous lump at the region of the left caudal mammary gland. Roxy had previous history of mammary neoplasia and 18 months earlier had three masses removed and an ovariohysterectomy due to pyometra. Laboratory histopathology diagnosed two complex carcinomas and one solid carcinoma with guarded prognosis. Two years previously, Roxy presented with back pain and abnormal gait. Radiographs showed an abnormal shaped thoracolumbar junction area. No further investigations were carried out due to cost.

Physical examination

On examination heart and respiration sounds were obscured due to panting. Heart rate was 96 beats per minute, mucous membranes were pink, capillary refill time under 2 seconds and temperature 38.3 °C. The mass was found to be ulcerated and bleeding. The rest of the mammary strip was impalpable due to heavy matting of the coat.

Surgical nursing of a long-term patient: mastectomy

Diagnosis

The Veterinary Surgeon (VS) gave a differential diagnosis of a mammary tumour, given previous history. Mass removal was advised assuming thoracic radiographs showed no evidence of metastases.

Aetiology

The cause of mammary gland neoplasia is unknown (Williams, 2015). However, many are hormone-dependant with oestrogen and progesterone receptors found in 70% of benign canine mammary tumours (Fossum et al., 2007; Kristiansen et al., 2016). It is documented that neutering before first oestrous can significantly decrease the risk of mammary tumour development later in life (Kristiansen et al., 2016; Williams, 2015). A systematic review of evidence for this (Beauvais, Cardwell, & Brodbelt, 2012) found that there was insufficient evidence to support this claim. In the absence of a more up-to-date review of current evidence, the profession should be cautious in the advice given to clients (Beauvais, Cardwell, & Brodbelt, 2012).

Pre-operative nursing

Roxy's right leg was prepared aseptically and a 20-gauge cannula inserted. Roxy was placed on isotonic crystalloids (Hartmann's, Aqupharm) at 4 ml/kg/h to help support circulating volume and tissue perfusion as maintaining homeostasis and normal organ function is more difficult in geriatrics during anaesthesia (Murrell & Ford-Fennah, 2011). Also, anaesthetic induction and gaseous agents cause a dose dependant decrease in blood pressure due to decreased vascular resistance caused by vasodilation (Challis & Seymour, 2008). Roxy was given methadone (Comfortan, Dechra) 0.3 mg/kg intravenously (IV) as a pre-medication and opioid analgesic and amoxicillin/clauvulanic acid (Synulox, Pfizer) 8.75 mg/kg subcutaneously (SC).

Bloods were taken for biochemistry, haematology and electrolytes to assess for any concurrent disease, as results are unspecific for mammary tumours (Fossum et al., 2007). Bloods were unremarkable, so meloxicam (Metacam, Boehringer) 0.2 mg/kg SC was administered. A multimodal approach is recommended for these patients (Daniels, 2013), which can reduce the doses of anaesthetic agents required and therefore reduce the negative dose-dependent effects (Murrell & Ford-Fennah, 2011). However, non-steroidal anti-inflammatory drugs (NSAIDs) can cause hypoperfusion and impair renal function, so ensuring renal parameters are normal is vital before administration (Murrell & Ford-Fennah, 2011).

Conscious radiographs were taken of the right and left lateral thorax, while Roxy was restrained with sandbags to reduce anaesthetic duration. The disadvantages of conscious radiographs include patient distress and movement (Orpet & Welsh, 2011). The temperament of the patient should be considered before conscious restraint is undertaken and the patient should be handled calmly and reassured in a quiet, dimly lit room (Dennis, Northwood, Lhermette, Girling, & Butler, 2011). Patient movement is demonstrated in (Figure 1), as Roxy's elbow is obscuring the lung field due to inadequate restraint.

Positioning ties are contraindicated in conscious patients due to potential injury should the patient move (Dennis et al., 2011; Orpet & Welsh, 2011). Ideally, radiographs should be taken under general anaesthetic (GA) and the lungs manually inflated during exposure to ensure good image quality (Dennis et al., 2011).

Thoracic radiographs are highly recommended at the time of diagnosis as 25–50% of malignant tumours have pulmonary metastases (Fossum et al., 2007; Williams, 2015). Abdominal radiographs or ultrasound are also indicated to assess for enlargement of the iliac lymph nodes with caudal tumours (Fossum et al., 2007).

The surgery was unplanned and classed as contaminated as the mass was ulcerated and infected, so was carried out after clean operations. Theatre was wiped down with disinfectant, and necessary equipment and materials placed in theatre (Box 1).

Due to heavy coat matting, Roxy was de-matted and clipped prior to anaesthesia to reduce duration. Generally, pre-GA clipping is not advised as it increases skin bacteria and therefore increases surgical site infections (SSIs) (Bowers, 2012; Nelson, 2011; Roberts, 2013). In this case Roxy was clipped just prior to GA. Clipping more than 12 hours before is contraindicated as it is directly linked to skin infections due to rebound bacteria, where resident microbial flora can repopulate rapidly if removed (Bowers, 2012).

Propofol (Propoflo plus, Abbots) 4 mg/kg was administered IV through the cannula and intravenous fluid therapy (IVFT) was increased to a surgical rate of 10 ml/kg/h as instructed by the VS. Although 10 ml/kg/h is a common surgical rate used across many veterinary practices, the recommendations for this surgical rate have been criticised due to the lack of evidence in animal anaesthesia fluid rates (Muir, 2013). The American Animal Hospital Association therefore recommends a starting rate of 5 ml/kg/h for dogs to reduce the risk of hypervolemic-related problems (Davis et al., 2013).

A closer clip was then performed with a 15-cm margin around the mass, the hair was removed using a vacuum and initial skin preparation carried out using disposable gloves to prevent cross-contamination (Roberts, 2013) and manually scrubbed with a 50:50 chlorhexidine solution.

Roxy was transferred to theatre and positioned in dorsal recumbency supported cranially with a trough. A final skin preparation was carried out using sterile gloves and swabs with a 50:50 chlorhexidine solution. Sterile gloves are recommended to reduce bacterial contamination of the surgical site via the operator's hands (Bowers, 2012). Antimicrobial activity can be reduced further by using an alcohol spray or a 2% chlorhexidine gluconate 70% isopropyl alcohol applicator, as used in this case (Ayoub, Quirke, Conroy, & Hill, 2015; Roberts, 2013).

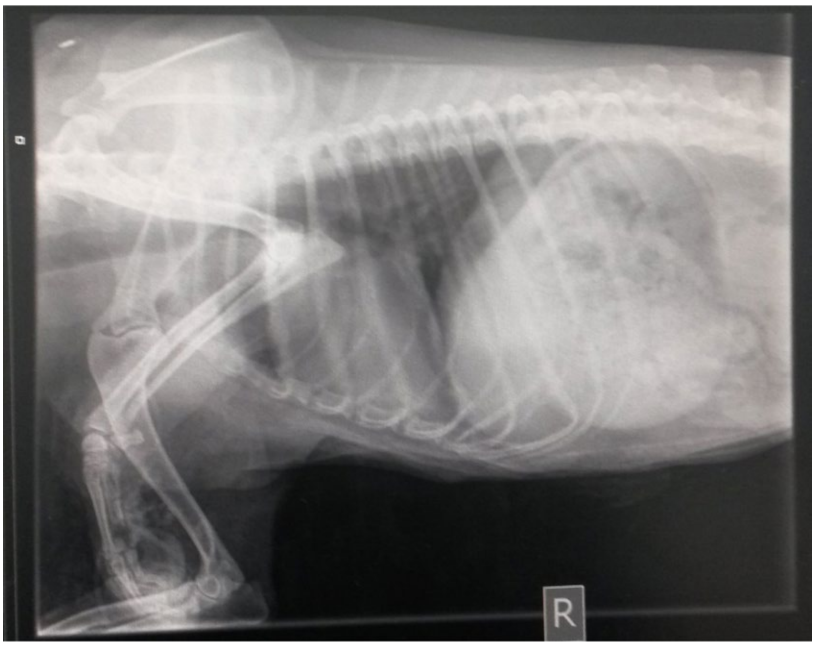

Figure 1. Right lateral thoracic radiograph displaying elbow in field of view. (*Source*: Vets4pets Evesham, 2018.)

Box 1. Equipment required for mastectomy

Preparation:
Disposable gloves
Plain gauze swabs
Chlorhexidine 50:50 solution

Surgical:
Large standard surgical kit
- 4 X-ray swabs
- 4 Backhaus towel clips
- 1 scalpel handle size 3
- 1 rat tooth forceps
- 1 Adison rat tooth forceps
- 1 dressing forceps
- 1 Metzenbaum scissors
- 1 Mayo scissors
- 1 Olsen-Hegar needle holders
- 2 straight artery forceps
- 4 curved artery forceps (large)
- 2 curved artery forceps (small)
- 2 Halsted mosquito forceps
- 1 Allis tissue holding forceps

Extra pack 4 × plain sterile gauze swabs
Size 15 scalpel blade
½″ Penrose drain
Sterile gloves
Sterile disposable 75 × 90 cm drape
2 × 2-0 PDS II
2 × 3-0 Ethilon

Roxy was positioned on a heat pad to prevent hypothermia with a Vetbed® on top to prevent thermal burns and her temperature monitored every 10 minutes under anaesthesia. Hypothermia is a risk for all anaesthetised patients due to the depression of the central nervous system (Davies, 2012). Electric heat pads assist in maintaining body temperature; however, there is a risk of thermal burns from their use and more suitable methods such as forced-air warming are preferred (Davies, 2012; Murrell & Ford-Fennah, 2011). Pre-operative patient warming has been shown to be effective in a small human study (Just, Trevien, Delva, & Lienhart, 1993). Therefore, housing patients in a warm kennel area pre-operatively may be advantageous (Davies, 2012).

Peri-operative nursing

During this procedure the author took the role of surgical assistant. The author, wearing a scrub suit and theatre shoes, donned a hat and mask. A hand wash was performed using regular soap as this was the first sterile hand prep of the day. Sterillium® was then applied and rubbed into the hands and forearms for 90 seconds as per the manufacturer's guidelines. A sterile gown was offered by the circulating nurse and a closed gloving technique performed. Sterile gloves have been shown to significantly reduce the risk of SSIs (Verwilghen et al., 2011). There is no evidence to support the use of scrub suits and theatre shoes in theatre; however, it is thought their use contributes to good theatre discipline and may therefore reduce SSIs (McMillan, 2014). Dehiscence is a complication associated with mastectomy (Fossum et al., 2007), and so reducing SSI risk is paramount.

The author's role was to support the mass and position it to enable the VS to blunt dissect tissue and ligate blood vessels. Passing of suture material, swabs, swab counting at the start and end of surgery and haemostasis was also performed. Gentle tissue handling and correct haemostasis techniques are important for tissue vitality and reduction of SSIs (Roberts, 2013). Anaesthesia was carried out by an additional nurse and a circulating nurse passed materials to the VS in a sterile manner. Having a surgical team helps maximise the efficiency of the surgery (Young & Tivers, 2008). However, additional personnel in theatre increases the risk of SSIs (McMillan, 2014; Roberts, 2013) and so the requirement of surgical personnel should be considered carefully.

Wound dehiscence can occur due to mass ulceration and dead space remaining after removal of the mammary gland (Daniels, 2013; Fossum et al., 2007); therefore, a Penrose drain was inserted via a separate stab incision, as dehiscence can occur where the drain exits a primary wound (Carne, 2011; Pope, 2017) and secured with Ethicon Ethilon, a non-wicking monofilament, chosen to reduce the risk of ascending infection (Beckett, 2015; O'Dwyer, 2012; Pope, 2017).

Buprenorphine (Buprecare, Animal Care) 0.02 mg/kg IV was administered peri-operatively, 4 h post methadone administration. Buprenorphine is a partial agonist and can reverse the effects of full agonists such as methadone, so should not be administered within its 4-h duration period (Challis & Seymour, 2008).

Following surgery, Primapore® was applied over the stoma site, including the drain, to reduce the risk of ascending infection (O'Dwyer, 2012). Ideally, layers of absorbent sterile dressing should be used and held in place around the abdomen (Carne, 2011; Pope, 2017). However, full abdominal bandages are prone to slipping (Chandler & Middlecote, 2011).

Post-operative nursing

Roxy was mildly hypothermic so covered with a blanket in a warmed ward and monitored every 5 minutes until she could support herself in sternal recumbency. When attempting to take Roxy out to toilet, Roxy could not support any weight on her hind legs. The owner advised this occurred after the last surgery and was possibly due to her previously reported spinal issue. Roxy was given passive joint movement physiotherapy of the hind legs which is indicated post-surgery to encourage circulation and muscle relaxation (Sharp, 2008). She was then supported with a towel around her chest and supported by a hand either side of her hind legs due to the position of the surgical site. It is recommended that if you expect a patient to be non-ambulatory post-surgery, to manually express the bladder or place an indwelling urinary catheter during anaesthesia (Crompton & Hill, 2011), although this has associated complications of cystitis, urinary tract infections and urethral damage (Chandler & Middlecote, 2011).

A complication of drain placement is patient interference resulting in contamination or premature removal (Carne, 2011; Pope, 2017). In this case an Elizabethan collar was suitable to prevent these complications. The Primapore® required regular changing to prevent strike-through, as this risks ascending infection (Carne, 2011). The skin at the drain exit site can become sore with fluid production, so applying emollient to the skin is recommended (Carne, 2011; Pope, 2017).

Client communication

Roxy was discharged later that day when she was ambulatory and had voluntarily urinated. The owner was asked specifically to monitor her ability to walk and urinate. A standard post-operative care sheet was given along with specific care for Roxy. It was reiterated to the owner that despite previous ovariohysterectomy, mammary masses could still occur in the remaining glands (Kristiansen et al., 2016; Williams, 2015), and monitoring for local recurrence every 3–4 months is recommended (Fossum et al., 2007).

Dietary recommendations for neoplasia include reduced carbohydrates and increased omega-3 fatty acids which may improve remission by inhibiting tumour behaviour and starving it of nutrients (Gajanayake, Lumbis, Greet, & Girling, 2011; Lumbis & Chan, 2008). Therefore, Hills n/d was recommended.

Conclusion

Nurses are required to be adaptable when faced with unplanned procedures and fit them into the operation schedule accordingly. Surgical nursing can take many forms including anaesthetist, surgical assistant and circulating nurse. The nursing team should be managed to ensure efficacy but with consideration of SSI risks.

Pre-GA clipping is not recommended, but should be considered on an individual basis, with patient well-being assessed against the risk of SSI. It is important to minimise the risk of SSIs in practice and despite a lack of evidence to support the use of some surgical attire, its use is still recommended to contribute to theatre discipline, which may inadvertently reduce SSIs.

Nurses are advised to use standard surgical rate fluids (10 ml/kg/h) with caution. A surgical rate of 5 ml/kg/h is recommended in dogs; however, pre-operative hydration status and peri-operative blood pressure should be used to tailor this rate individually. More research is needed into the effects of fluids during anaesthesia in animals.

Disclosure statement

No potential conflict of interest was reported by the author.

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