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To cite this article use either DOI: 10.1111/vnj.12009 or Veterinary Nursing Journal Vol 28 pp44-46

Immediate postoperative recovery – Part 1

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ABSTRACT: The immediate postoperative period is often under-utilised as an opportunity to be proactive in terms of improving patient well-being and increasing the likelihood of a successful outcome. This paper discusses several ways in which this can be addressed easily in practice. The first part discusses the aims of immediate postoperative recovery and deals mainly with reducing patient morbidity and pain and improving wound healing. The second part discusses the role of nutrition in improving patient recovery, and touches on ancillary rehabilitation methods, including local hypo- and hyperthermia, passive range of movement exercises and behavioural concerns.

Introduction

'To strive, to seek, to find, and not to yield'.

This was the final line of Alfred Lord Tennyson's poem *Ulysses*. It was chosen as a motto for the 2012 Olympics and seemed to epitomise the unbending faith and determination of Olympic athletes. However, the previous line of the poem seems rather more apt for us lesser mortals who are:
'Made weak by time and fate, but strong in will'.

Although this couplet may be used as any anthem to improvement, I feel it is particularly apt with regard to postoperative care and recovery.

The vast majority of surgical procedures performed in veterinary practices are just that: surgical procedures. Other than monitoring the patient during recovery and paying attention to analgesia, there is usually no further interaction with the patient until discharge. It is well recognised in the human surgical field that postoperative rehabilitation protocols reduce hospitalisation times and improve patient recovery, both by reducing recovery times and by improving surgical success.[1]

Postoperative care can incorporate a variety of rehabilitation and recovery interactions; many of which can dramatically, and at little cost, improve overall patient well-being. Aims of patient recovery are listed in Table 1.

Reducing mortality/improving recovery from anaesthesia

The majority of anaesthetic deaths occur in the immediate postoperative period; unfortunately this is often as a result of inadequate monitoring.

The patient should be monitored continuously until conscious and able to support itself in sternal recumbency. The recovery area should be warm – many patients will be slightly hypothermic, so an overly warm room is recommended. There should be adequate levels of staff to ensure individual attention as well as rapid access to emergency drugs, oxygen and endotracheal tubes.

The level of monitoring will depend on the health of the patient and the nature of the surgery. Older patients, or immature ones, may be less able to metabolise some anaesthetic or analgesic agents effectively. Animals that have been in poor nutritional health prior to surgery may similarly have prolonged recovery times – especially if hypoproteinaemic, as many drugs bind to proteins in the bloodstream, reducing their relative potencies.

TABLE 1 Aims of patient recovery in the immediate postoperative period

To reduce mortality/improve recovery from anaesthesia
To improve chances of wound healing
To provide analgesia
To ensure a quick and complete return to function
To avoid infection
To meet nutritional demands
To reduce postoperative complications
To reduce morbidity

Pain and hypothermia will also prolong recovery times: an extra five minutes prior to surgery, planning the most effective analgesic protocol, may well save 15 minutes of post-anaesthetic monitoring.

The endotracheal tube (ET) should be left in place until the gag reflex returns (NB: cats should be extubated prior to gag reflex recovery, as gagging or retching on an ET tube can cause severe laryngeal trauma). Ideally, the ET should be removed at the end of inspiration, so that expiration expels debris and secretions.

Special care should be taken with brachycephalic breeds – even fairly mild increases in the already present airway obstruction can cause pulmonary oedema, leading to morbidity or death later on. Oxygen therapy, or even re-intubation, may be necessary in these patients.

It can be difficult to assess adequate ventilation in some patients, especially recumbent or obese ones. Pulse oximetry can be useful, but it is often difficult to maintain probes in position.

Regular checking (every 5-10 minutes, depending on the patient) of mucous membrane colour, capillary refill time (CRT) and heart and respiratory rates is the most effective way of continued monitoring.

Certain premedicant drugs (for example, medetomidine and detomidine) cause respiratory depression in the postoperative period. It is important to remember that although reversing theses agents will improve respiration, this may also result in reversal of the analgesia provided by the drug.

Hypotension is the most common circulatory complication following anaesthesia and may be the consequence of hypovolaemia, blood loss, hypothermia, drugs or pre-existing disease. Regular blood pressure monitoring (or continuous monitoring with a pre-placed central venous line) is the best way of detecting this, but regular examination of the mucous membranes for colour and CRT, heart rate (HR) and urine output will also provide information as to dropping blood pressure.

If hypotension is suspected, then intravenous fluid therapy (IVFT) should be instigated or increased to around 5-10x maintenance. Overt haemorrhage should be controlled by applying pressure dressings to bleeding areas, or around the hind limbs and abdomen.

Hypothermic patients are at increased risk of death in the postoperative period, owing to central nervous system (CNS) depression, reduced metabolism of drugs, pulmonary and cerebral oedema and cardiac arrhythmias. Hypothermia also increases the chance of wound breakdown by reducing blood supply and oxygen to healing tissues.

Hypothermia is best avoided by providing a warm environment, together with blankets and warming devices. Scrub solutions should be made up using warm water, and crystalloid fluids should be warmed for intravenous and flush use. If hypothermia develops, then heat can be provided with 'Bair-Hugger' type hot air systems, 'hot hands' blankets and heat pads; although immense care must be taken to avoid burns to the patient. If necessary, catheterising the bladder and flushing with warmed saline can help.

TABLE 2 Halsted's Principles of soft tissue surgery

Gentle tissue handling
Meticulous haemostasis
Preservation of vascularity
Strict asepsis
Avoidance of wound tension
Good approximation of tissues
Avoidance of dead space

Improving wound healing

In the 1890s, William Halsted, a surgeon, at Johns Hopkins Medical School, put together seven rules (Halsted's Principles) for soft tissue surgery, which, if followed, should lead to successful wound healing (Table 2).

These principles remain the standard for surgery. However, there are many factors that affect wound healing and that can be considered alongside Halsted's Principles.

Oxygen

All tissues need oxygen to heal and grow. Unless microvascular surgery has been performed to rejoin blood vessels bridging a wound, there will be a reduced oxygen delivery to those healing tissues.

Although the use of hyperbaric oxygen is the remit of specialist or teaching hospitals, it may be worthwhile considering an oxygen cage for patients with congestive heart failure, or other pulmonary disease.

Movement

Movement of wound edges disturbs growth of new blood vessels and disrupts healing. Application of a dressing or bandage may reduce wound disruptive movement. However, care should be taken not to overly restrict movement, as this can lead to restrictive scar tissue formation or loss of joint function (see later).

Hypoproteinaemia

Patients with protein levels below 22mg/dl are considerably less efficient at wound healing and are at risk of wound breakdown. Supplementing with DL-methionine or cysteine or administration of fresh-frozen plasma may help. If possible, surgery should be delayed until adequate nutrition has corrected the hypoproteinaemia.

Concurrent illness/disease

Uraemia directly affects cellular healing – additionally, patients with chronic kidney disease (CKD) will tend to be on a poor plane of nutrition and have reduced appetite and delayed recovery from anaesthesia.

Wherever possible, CKD patients should be stabilised prior to surgery and they often benefit from 24 to 48 hours of IVFT prior to a procedure. Similarly, diabetic patients will have reduced tissue healing and an increased risk of postoperative infection. They should be stabilised prior to surgery and glucose monitored regularly during and after anaesthetic.

Other diseases (for example, liver disease, Cushing's disease) will carry their own panoply of caveats and special requirements. It would not be appropriate to discuss

Figures 1a and 1b: Patient with jaundice – this terrier benefited from three days of IVFT and naso-oesophageal tube-feeding prior to liver biopsy

each condition in this article, but care should be taken to devise a specific disease care plan prior to anaesthesia and surgery on any patient with a chronic illness (Figures 1a & 1b).

Analgesia

It was once thought that 'a little pain' would stop the patient moving around too much, risking a wound breakdown or re-fracture. Now it is well recognised that pain is generally regarded as a bad thing postoperatively. Not only does pain reduce healing at a cellular level, it also reduces use of the affected limb leading to reduced range of movement, decreased cartilage quality and muscle atrophy which may be irreversible.

Pain also reduces appetite, thereby decreasing healing still further. It is also difficult to assess healing adequately in animals that are in pain; infection or loosening of implants may go unnoticed on the basis of an assumption of continuing pain.

It is vital to anticipate pain and try to prevent it, rather than allowing wind-up to occur, leading to central sensitisation – this can lead to a chronic pain state which is very difficult to control. Excellent reviews of pain pathways are given elsewhere and fall outside the remit of this article.[2] However, every consideration should be given to the formulation of a peri-operative analgesia regimen for an individual patient: there is no 'one-size- fits all' mixture of analgesics.

Peri-operative analgesia should be 'balanced'. This entails using a combination of analgesic types to block different pain pathways. Ideally, non-steroidals, opioids, dissociative analgesics (for example, ketamine), α2 agonists and local anaesthetics should all be used judiciously to provide analgesic cover at all levels of tissue, spinal and central pain pathways.

Figure 2: In-dwelling analgesic line ('soaker drain') placed following removal of a vaccine-related sarcoma in a cat

Anxiolytics, such as midazolam, may also help provide a calm patient on induction and recovery with reductions in anaesthetic doses and thus quicker recoveries.

Clearly, to avoid pain wind-up, the analgesics must be provided prior to the painful stimulus, and repeated or maintained at intervals that prevent the appearance of pain. This requires meticulous monitoring and can only be achieved by objective pain scoring.

As an aside, it is important to remember that many of these analgesics – or analgesic combinations – are not authorised for veterinary use. It is very important to obtain informed consent for such 'off-label' use.

In-dwelling analgesic lines ('soaker drains') are an amazingly effective way of controlling pain (Figure 2). In essence, these are multiply-fenestrated catheters inserted into the surgical site. Local analgesic (lignocaine, bupivicaine, mepivicaine, for instance) is then flushed through every one to four hours.

Use of local anaesthetics has been shown to improve patient demeanour and recovery dramatically.[3]

Part 2 of this article will appear in the March 2013 issue of VNJ and will deal with nutritional, rehabilitation and behavioural aspects of postoperative recovery. VNJ

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