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Caroline qualified in 2001 after attending Myerscough College, Preston, whilst working in Carlisle. For the last eight years, she has worked at a small animal practice in County Durham, recently taking on the role of head nurse. Since attending a CPD course in 2010, she has developed a keen interest in wound management and has more recently become involved in the creation of the 'Bandaging Angels' – a group set up by the Veterinary Wound Library to provide in-house CPD bandage training to practices.

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Gold-standard bandaging

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ABSTRACT: Iatrogenic problems resulting from inappropriate bandaging techniques are very common. Owners should be warned that there may be consequences, particularly with long-term dressings. However, as this article will show, many of these issues are avoidable. Measures can be taken to prevent the commonest problems and to ensure that we, as nurses, are providing the best possible standard of care for our patients. This article discusses the techniques recommended and the theory behind them, to help us achieve gold-standard care. The foundation for gold-standard care is applying sound evidence-based medicine to practice.

The Veterinary Wound Library, www.vetwoundlibrary.com, has set up a new CPD initiative that aims to educate veterinary staff on gold-standard bandaging techniques. The founder, Georgie Hollis, was prompted to set up the 'Bandaging Angels' in response to an increasing number of wound cases caused by inappropriate bandaging techniques submitted to the library. It highlighted the need for increased knowledge and education within veterinary practices.

The aim of the group is to improve animal welfare and reduce iatrogenic injury from bandaging. The 'Angels' will teach a range of gold-standard techniques that have been developed by working with specialists in the field. As very little evidence is available on bandaging techniques, where standards are lacking, the 'Angels' will work with the specialists to provide an evidence-based solution.

This knowledge will be used to help and educate vets and nurses to resolve issues and improve standards. The training will be delivered as an in-house CPD theoretical and practical session involving the whole team.

There are several types of problem that can occur whilst bandaging. Some are within our control, whilst others result from external factors that come into play when the patient leaves the surgery and is then under the care of the owner. The focus of this article will be on limb dressings, describing the complications that can occur, and the steps we can take to try to prevent them. The importance of good client communication and compliance is also highlighted.

Functions of a bandage

Why do we dress a limb? There are many functions of a bandage (Williams & Moores) (**Table 1**). All these functions positively promote healing. When a dressing bandage malfunctions, the bandage itself can actively cause further injury to the patient.

Why do things go wrong?

There are many reasons why a patient may develop further injuries following bandage application. The two main causes can be classified into Primary and Secondary ischaemic injury.

Primary injury occurs whilst the bandage is still in place. There may be an interruption – or reduced blood flow – to the tissues in the limb, which causes direct pressure necrosis.

Secondary injury and reperfusion injury occur 24-48 hours after the removal of a bandage. It is caused by the return of blood into tissue that has suffered a

Table 1. Functions of a bandage (from Williams & Moores, 2009)

- Protect the wound from contamination by the environment
- Prevent interference from the patient
- Prevent further tissue damage from desiccation (drying out)
- Provide a moist environment for optimal wound healing
- Provide warmth (faster rate of healing)
- Provide pain relief
- Immobilise skin edges
- Provide pressure to close dead space or reduce swelling or haemorrhage
- Deliver topical agents to control wound healing
- Absorb exudate
- Debride wounds using specific products
- Stabilise concurrent orthopaedic injuries

period of ischaemia or lack of oxygen. As blood flows back into the tissue, an inflammatory reaction is created which causes deterioration even after the bandage is removed (Nelissen, 2013).

Causes of injury arising from inappropriate bandage application include:

- bandage too tight, either on initial application or if it later constricts because the limb swells or the dressing gets wet
- bandage too loose – this can cause problems if the bandage then slips, causing friction and soft tissue abrasions. Further problems will arise where the slipped bandage ceases to provide the intentioned immobilisation as the area will cease to be effectively supported
- inadequate padding
- inadequate protection of vulnerable areas, such as joints
- skin damage from the use of adhesive tape/stirrups.

Causes of injury relating to owner compliance include:

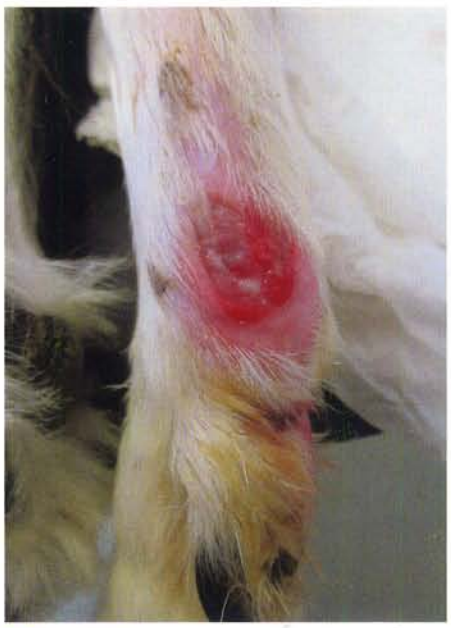


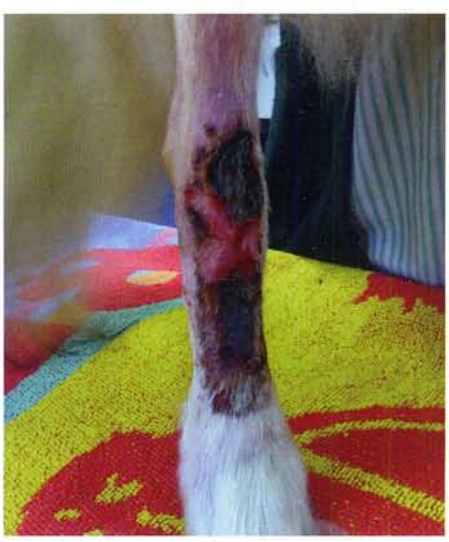
Figure 1. The patient suffered a pressure sore on the lateral aspect of the carpus. It was very quickly resolved by the use of a 'doughnut' dressing to relieve the pressure

- allowing the bandage to become wet, which would then cause it to tighten
- leaving the bandage on for too long after failure to return for a planned appointment or reluctance to return for a dressing change owing to costs involved
- over-exercise whilst the bandage is in place. (McKeating, 2013 & Nelissen, 2013).

If any one of these factors is present, it can lead to complications.

In cases of primary ischaemic injury, a pressure sore **(Figure 1)** or skin necrosis **(Figure 2)** may develop, the latter would require debridement.

Figure 2. The patient's limb had been 'casted'. Upon removal of the cast, substantial skin necrosis had occurred



In more severe cases of secondary ischaemia, there is a risk of loss of digits or, in extreme cases, the loss of a limb **(Figure 3)**.

The early stages may manifest themselves in the patient as an excessive interest in the bandage, such as licking or chewing at it, and this should not be ignored – the dressing should be removed immediately.

One study (Anderson and White, 2000) concluded that 'ischaemic injury could be attributed to inadequate padding or uneven application of a bandage resulting in pressure points'. The authors strongly recommended that all owners receive instructions on home care and inspection of bandages. The majority of injuries are sustained within 24 to 48 hours of application, and removal of the bandage within that period would have prevented the injuries seen.

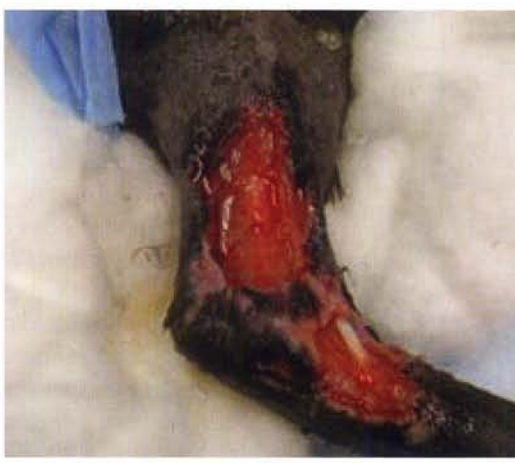


Figure 3. A small avulsed wound was closed surgically and a light support dressing applied. The patient chewed the dressing the following day, was off her food and subdued. The client ignored these symptoms and the advice they had been given and returned for a routine appointment 3 days later. The nurse was presented with a dressing with an unpleasant odour, which was very painful to remove and had resulted in this severe injury to the limb

Where do we stand under our duty of care?

Adequate information must be given to clients regarding bandage aftercare (McKeating, 2013).

The Veterinary Defence Society (VDS) dealt with 74 'Duty of Care' calls in relation to bandaging between 2010 and 2013. This highlights the need for good communication with clients when a patient is discharged with a bandage. Any defence can be weakened if

Table 2. Example of a client information sheet

Insert practice logo and contact details, including OOH cover

Care of your pet's bandage

PLEASE CHECK YOUR PET'S BANDAGE THOROUGHLY TWICE A DAY

Please follow this advice carefully and if you have any concerns at all contact the practice as soon as possible for advice from one of our nurses. Bandages have the potential to cause further injury to your pet if they are left in place when there is a problem, so the following information is very important.

Exercise

Please restrict dogs to very short lead walks only, no free running. Cats should be kept indoors and restricted to one room if possible.

Protection of the dressing

When taking dogs outside, cover the dressing with a loosely tied plastic bag or empty drip bag. Remove it immediately on return home. Plastic does not allow the dressing to 'breathe' and will cause problems if left on. Ideally, purchase a specially designed waterproof, breathable cover. Ask for more details.

Bandage problems

These can occur very easily owing to the nature and lifestyle of our pets. If any of the following occurs then contact the surgery immediately:

- The bandage becomes wet or soiled
- The bandage slips
- Too much exercise
- The bandage tightens

Signs to look out for

- If your pet is in any way unwell – lethargic, off food, lame, showing signs of pain or discomfort. Any of these signs can be an indication that there is a problem with the dressing and should not be ignored.
- If your pet is bothering the dressing by licking and chewing it could indicate discomfort with the dressing or that it has become too tight.
- If the dressing starts to smell unpleasant this could mean it has become wet, the wound is infected or further damage has occurred.
- The bandage has slipped from its original position – this means that the dressing is no longer providing the support that it should and can cause injury as the padding will also have slipped and vulnerable areas will no longer be protected.

The nurse will advise you when to schedule a return appointment for the dressing to be changed. The bandage should not be left on any longer than advised so if you are unable to keep the appointment please inform the nurse as soon as possible.

If any problems occur and they are ignored, it can result in circulatory problems and cause severe damage to the skin and leg, so please contact the practice immediately if you have any concerns about the dressing.

insufficient warning of possible risks has not been given to the client. A print-out personalised with the practice details is the best way to ensure that clients have all the information they need to take home with them (**Table 2**).

They must be fully informed of the frequency of checks and how to protect the bandage. Traditionally, an empty 'drip bag' is the most commonly used protection (**Figure 4**); but there are now much more suitable breathable, waterproof alternatives, such as the Medipaw, available from JAK Marketing (**Figure 5**).

How can we prevent problems?

Training veterinary staff will decrease the overall risk. Understanding why problems can occur will lead to a better understanding of the steps to take to prevent them. Educating clients about bandage aftercare is also of utmost importance.

As most bandage injuries occur within 24 to 48 hours of their application, it could be deduced that if we changed the bandage within that period we would prevent any problems. In reality, that may not be practical for a number of reasons, which is why it is so important to ensure correct application of a bandage, to give correct advice and to ensure that the owner understands that they must not ignore any problems.

Determination of the frequency of bandage changes should be made on an individual basis, although three to four days' wear without complication should be achievable if the correct technique is used.

The bandage should be checked frequently, and the practice should have

Figure 4. Drip bag in place

regular contact with the owner following discharge. Owners should be educated on signs of bandage-related problems and implications and a return appointment should be scheduled before leaving the clinic **(Table 2).**

Limb dressings

A consistent technique should be used as the basis for all limb dressings, including the Robert-Jones technique. An appropriate primary layer and topical agent should be used to promote the optimal healing environment. The combination of secondary and tertiary layer together determine the pressure on the wound (Nelissen, 2013)

Secondary layer

The toes (including dew claws) should be well padded. The preferred product is a synthetic padding (e.g. Orthoband, Millpledge) as it is less likely than cotton wool to change its shape in response to moisture and movement. Use long lengths and push to the base of the toe **(Figure 6)**.

Figure 5. A Medipaw bandage cover in place over a large Robert-Jones dressing. It comes in various sizes and provides brilliant protection for the dressing

Figure 6. The toes should be adequately padded using a synthetic padding between each toe

The third and fourth distal phalanges should be left exposed to aid monitoring. The secondary layer should be started at the second phalange of the central toes working distally upwards with a 50 per cent overlap.

The pre-rolled synthetic padding is recommended, with a minimum size of 10cm. The wider the padding, the less pressure it can create (Nelissen, 2013).

Incorporate 'doughnut' dressings as necessary to protect vulnerable areas such as stopper pads, hocks, elbow and bony prominences **(Figure 7).** They are quick and simple to make to any size and are excellent at relieving pressure **(Figure 8)**.

Their usefulness for every dressing should not be underestimated. If a foot injury is present, a 'doughnut' should be used to relieve the pressure from the wound and the foot should be enclosed.

Figure 7. 'Doughnut' in place on a hock

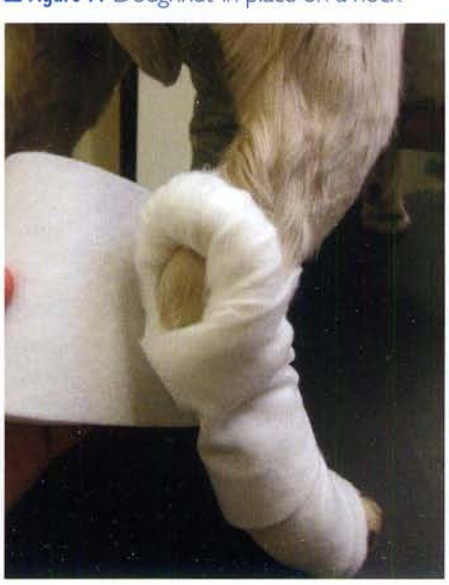


Figure 8. 'Doughnuts' can be used to protect vulnerable areas – such as hocks, elbow, stopper pads – from pressure sores. They are quickly and easily made by wrapping padding around the fingers, then folding the padding inside and round the circle made. They can be made to any size

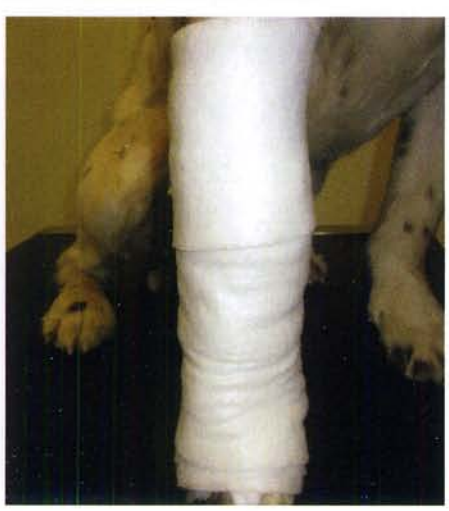
The padding layers should be repeated until a uniform radius is achieved (Figure 9). Extra padding should be added as necessary, rather than following the contours of the leg. This provides the narrower areas with extra padding to ensure an even distribution of tension throughout the leg.

Tertiary layer

A tertiary layer of conforming bandage (e.g. Knit-fix; Millpledge) is then used to hold the secondary layer in place, working distally upwards from the toes as previously described. Two layers of cohesive bandage (e.g. Wrapz, Millpledge) can then be applied.

Although commonly used, adhesive tape should not be necessary. It can cause skin inflammation and be a focus of tension around the leg, as well as being painful and possibly damaging to the skin.

Figure 9. Rather than following the exact shape of the leg, extra padding should be used to achieve a uniform radius



Each layer should be cut with scissors rather than torn (as this could put unnecessary tension on the dressing).

Why toes out?

Leaving the toes visible allows for monitoring of the foot. It increases the comfort for the patient as they can 'feel' their feet as they can spread their toes. It will also be less likely to result in skin damage to the foot if the dressing did become wet.

Discussion

Bandaging is a much more complex procedure than it is often given credit. It involves a lot of preparation, time and also cost to the owner. Gaining knowledge of the correct application of bandages is extremely worthwhile to prevent problems for the patient (and ourselves!).

We should aim to achieve best practice, defined as 'a method or technique that has consistently shown results superior to those achieved by other means and that is used as a benchmark. Best practice can and does evolve as improvements are discovered' (Nelissen, 2013).

The author feels this is a perfect attitude to have towards bandaging, and hopes that, by discovering advances in techniques, many patients will benefit by suffering from fewer complications.

Rules are not set in stone with approaches to bandaging. With practice and experience, we can see how improvements may be made. Bearing in mind the vast amount of inaccurate – often dangerous – online information that is available to clients on how to do their own bandages, we need to be seen to be providing a gold-standard service with a sound evidence base of knowledge on which we can base our techniques and choices. VNJ

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NEWS REVIEW by Jean Turner

Time to renew resolutions on rabbits

Resolutions made at the beginning of the year have long become a distant memory for most of us, but as we hit the mid-year mark, now is the perfect time to dig them out, dust them off and do them justice.

With veterinary professionals across the country having been encouraged to 'Think Rabbit+' throughout May, enhancing their rabbit-related repertoire of knowledge and skills may be top of their priority list and now Supreme PetFoods is claiming to make it easy for them to do just that through the launch of its exclusive seminar series online.

The lecture line-up, held live at London Vet Show last year, saw world-renowned rabbit experts gather from across the globe to discuss a host of hot topics in rabbit medicine and surgery, including dental disease, digestive disorders, calcium metabolism, urinary disease and the all-important 'sticky bottom' syndrome.

The round table of case-based discussions also provided a rare opportunity for the audience to have their questions answered by rabbit specialists and discuss the complexities of some example cases.

The full series is now available for vets and nurses to view online, along with a whole host of other helpful resources, supplying world-class information right to their fingertips – and all for free! In addition to the exclusive online lectures, practices also have access to an array of free Supreme support materials including a series of professional waiting room videos, ideal for client education, as well as a variety of vital downloadable practice documents, available at www.supremepetfoods.com/vet-zone

The 'Think Rabbit Virtual Manual' is full of handy hints and tips on how to make practices more rabbit friendly and is available for free download at www.supremepetfoods.com/think-rabbit

Charly Pignon

Molly Varga, BVetMed DZooMed MRCVS, RCVS Specialist in Zoo and Wildlife Medicine, whose lecture was entitled, 'Rabbits and Calcium: how much is too much?' believes that there should be more information available when it comes to rabbits, "With current concepts in rabbit medicine and surgery rapidly evolving, access to convenient, concise and cutting edge information is crucial for the whole veterinary team. The only way this is possible is through initiatives such as this seminar series, which drives our knowledge and expertise forwards.

Other speakers in the seminar series included, Charly Pignon DVM, Head of the Exotics Medicine Service at the Centre Hospitalier Universitaire Vétérinaire d'Alfort in France, Professor Anna Meredith MA VetMB CertLAS DZooMed MRCVS, Livia Benato MRCVS, Lecturer in Rabbit and Exotic Animal Husbandry and Nutrition and Wendy Bament RVN BSc (Hons) MSc, Exotic Animal Veterinary Nurse. The interactive discussion session was chaired by Anna Meredith and involved a whole host of interesting cases, from urinary disease to best practice treatment of dental abscesses.

So, whether wanting to re-start those long-forgotten resolutions, consolidate knowledge or just continue to 'Think Rabbit+', vets and nurses aiming for clinical excellence should hop online and sign up for the free seminars and resources at www.supremepetfoods.com/vet-zone

For more details about the 'Think Rabbit+' campaign and to download the Think Rabbit Virtual Manual, visit www.supremepetfoods.com/think-rabbit