



Roll on cuff system compared to conventional equipment



The main difference between the roll on cuff system and conventional equipment

1. Achieving a bloodless field

- A. The conventional equipment used in Europe to achieve a bloodless field has usually been the Rubber Esmarch Bandage (Ref.1).
- B. There has also been a “sausage like device” that consists of a double rubber cylinder (Ref. 2, Rhys-Davies) that is removed after the conventional cuff has been put on.
- C. S-smart™ is a disposable device from Israel that resembles a large sock with a silicon ring. The sock is slipped on the extremity in order to create a bloodless field (Ref.3).
- D. Some surgeons find it sufficient to keep the extremity elevated for some minutes prior to applying a conventional cuff. When the blood stream is cut off the limb is not emptied of blood. The limb can possibly be elevated, but the blood is not drained when the conventional cuff is pumped up. The “bloodless field” is therefore not bloodless at all.

The Boazul roll on cuff achieves a bloodless field due to the roll-on function.

When rolled on the blood will automatically be pressed away and the limb will become bloodless.

2. Maintaining a bloodless field

Conventional equipment: An ordinary blood pressure cuff is wrapped around the limb and attached with Velcro and strings. It is fixed above/proximal to the surgical area. The cuff can then be inflated to a desired pressure. The pressure does not usually remain constant due to leakage in connections and hoses (Ref. 4 and Ref 5). Therefore, it is necessary to have an air pressure source that continuously fills the system through a pressure regulator to combat any leakage.

In the literature there are descriptions of nerve damages under tourniquet cuffs (Ref.6). In many of these cases the tourniquet cuffs have impacted the limb to a higher pressure than the predetermined pressure. In many cases, it has been possible to trace the problems to a faulty manometer. An Australian investigation however, shows that complications, when using a bloodless field, occur rarely: 1/5000 in upper and 1/13000 in lower extremities (Ref. 7). The goal is to maintain the lowest possible pressure in the cuff, without jeopardizing the bloodless field. The pressure in the tourniquet cuff should be 50 to 100 mm Hg above the patient’s systolic pressure measured in the regular way (Ref. 8). In addition, it is also necessary to mention, that the conventional cuff width has been used here, which means <12cm. The wider the cuff is the less pressure is needed (Ref. 9 and 10). Optimal cuff width is about 50% of the extremity circumference (Ref. 6). There are sophisticated regulators that register the blood pressure and adjust the cuff’s pressure continuously (Ref. 11).

The roll on cuff stays in place with or without the special wedge.

The roll on cuff is recommended to be inflated to 120 mm Hg before rolling on. When rolled on the cuff will in many cases stay in place without any wedge. But if the extremity is shaped very conically you may need 1-2 wedges to keep the cuff in place. You can also use another cuff as a wedge. This wedge cuff should be inflated only to 5-10 mm Hg, so that the upper/proximal cuff can be rolled up over the underlying cuff. The two cuffs are now locked in a fixed position. The pair of cuffs are also functioning as an extra wide cuff.

3. Safety

The roll on cuff puts a pressure of 200-320 mm Hg against the extremity when the cuff is used within its working area.

Figure 1. Pressure diagram for larger cuff when rolled on with different pressure and the pressure against the extremity at working area 45- 70 cm.

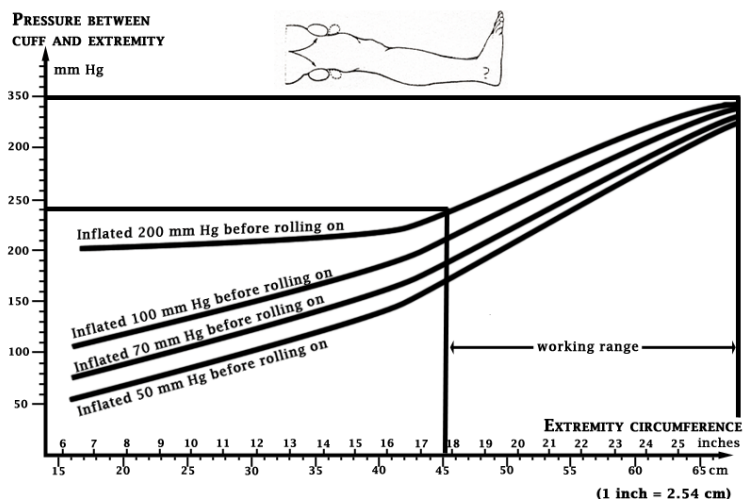


Figure 1.

(1 inch = 2.54 cm)



The roll on cuff has built in safety for high pressure levels. If the cuff is inflated more than instructed before it is rolled on it will become very big. The rubber walls are expanded and the rubber material is spread out over a larger area. Compare La Place formula 2 (Ref.12) which describes how the pressure within the walls in an elastic balloon is balanced by the wall tension divided by the radius.

$$(P = T/R)$$

P= Pressure, T= Tension and R= radius.

The more inflated the cuff is the larger it will become and the thinner the wall will become. Therefore excessive inflation does not increase pressure.

Thus, the rubber wall itself creates a built in safety device preventing extreme pressure levels. When conventional equipment is used, the safety depends on the status of the regulatory equipment at the time of surgery.

4. The roll on cuff (is mobile or) may be moved

The roll on cuffs are manufactured in different sizes. Each size works optimally between certain extremities circumferences. Within this “working range” the roll on cuff may be rolled up or down on the extremity without jeopardizing the bloodless field. This can be great help to a surgeon if the cuff is in the way. The sterilized cuff can also be moved or rolled across the area of surgery. A sterilized cuff can also easily be put on at any time during surgery. The conventional equipment completely lacks this feature.

The roll on cuff is autoclavable.

The roll on cuff can be sterilized in an autoclave at 134° C. We recommend methods that use hydroperoxid like Sterrad® and NU-CIDEX® (Johnson and Johnson). Please read our instructions for the roll on cuff for more information.

Pay extra attention to our warning about proper cooling of the special wedges.

5. Adjusts well

The roll on cuff adjusts well to any extremity and irregularity, especially when the extremity is conical. When the extremity is conical, it might be difficult to use a conventional cylindrical cuff to attain an even pressure on the extremity. Often the upper part of the conventional cylindrical cuff creates a higher pressure. The conventional model can also slide down, after which the bloodless field is lost.

6. The Boazul roll on cuff is easy to use

No compressed air is necessary. No electricity, hoses or cords are necessary. It is smooth, fast and easy to roll on or off. The roll on cuff can be rolled over the top of a thick bandage or cast.

7. The roll on cuff is excellent for regional anaesthetics

When regional intravenous anaesthetics are used with the roll on cuff the plastic catheter Venflon® is put into a distal. The vein and the cuff are rolled over and across the Venflon® up to a proximal position. The anaesthetic is given in a closed off vein system. If the cuff feels painful it can be rolled down on the numb area. The cuff is left in place until the operation is done and the bandage is put in place. The roll on cuff is rolled off over the bandage.

In comparison with the conventional double cuff, in which each inflation bag only is 5-6 cm wide, the roll on cuff is superior with a width of 10.5 cm. The wider the cuff the less pressure is needed to keep a bloodless field (Ref. 9). Furthermore, when the so-called double cuff is placed on large arms, it may not keep a bloodless field even though the pressure exceeds 300 mm Hg. Sometimes the explanation is that the small inflation bladder (5-6 cm wide) is expanded until the cuffs cover (usually a nylon fabric) compromises the pressure. Meanwhile, the underlying fat tissue is compressed and displaced so that the real pressure under the cuff is less than the manometer is registering (Ref. 13). The roll on cuff can, on the other hand, create a higher-pressure level on a larger extremity. Furthermore, it means that a narrower cuff will cause a greater risk for venous oozing due to a blood flow in the under lying bone (Ref. 14).

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