Short Communication

Epidermal bulla: A dermatology complication of radial artery compression band

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Abstract

Patent hemostasis technique is used with the trans radial (TR) band to prevent radial artery occlusion following diagnostic coronary angiogram or percutaneous coronary intervention using radial artery access. We report epidermal bulla as a complication of TR band usage and a modified patent hemostasis technique using barbeau test to prevent this complication.

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1. Introduction

Radial artery access for percutaneous coronary intervention (PCI) decreases access-related complications as compared to femoral access, more so during PCI for acute coronary syndrome. Radial access provides mortality benefit over femoral access.1 Radial artery occlusion at the puncture site was a concern although its incidence has decreased by achieving patent hemostasis using the TR Band® radial artery compression device. Dermatological complications have not been reported at the TR Band® site. We report the development of epidermal bulla at the puncture site after removal of TR Band®.

2. Case series

Radial access was preferred in 72% of the patients undergoing diagnostic or interventional procedures at our center. The TR Band® was used for hemostasis in 2687 patients over the time span of 25 months. Twelve patients who underwent procedures through the right radial access had blisters after removal of the TR Band®. These blisters varied in sizes from ≤0.5-cm vesicles (Fig. 1A) to >0.5-cm bullae (Fig. 1B) and were noticed after a mean time frame of 18 h and 59 min (varied from 14 h and 45 min to 26 h and 18 min) of TR Band® removal. Of these 12 patients, three underwent diagnostic coronary angiograms (CAGs), five patients underwent PCI, and rest of the four patients underwent CAG followed by ad hoc PCI with a mean waiting period of 124 min with radial sheath in situ. The local anesthetic used was a combination of 2 ml of 2% lignocaine and 1 ml (5 mg) of undiluted nitroglycerin. Radial hydrophilic sheaths were used in all patients; 5F in two patients, and 6F in nine patients; in one patient, 5F was used during CAG, following which it was upgraded to 6F during ad hoc PCI. After the introduction of sheath, a cocktail consisting of 2 mg of diltiazem and 100 μg of nitroglycerin were given through the sheath. For CAG, intravenous (IV) 2500 units of unfractionated heparin (UFH) was given as the anticoagulation regimen. For the PCI group, standard dose of bivalirudin or heparin was given as per American College of Cardiology/ American Heart Association guidelines. For the ad hoc PCI groups, IV 2500 units of UFH before CAG and standard dose of bivalirudin or heparin before PCI were followed. Mean sheath dwelling time was 13.6 min for CAG, 58.2 min for PCI, and 184.3 min for the ad hoc PCI group. Patent hemostasis was achieved using 24-cm regular-length TR Band®, radial compression device, Terumo Interventional Systems. TR Band® was placed by positioning the dual compression balloons over the puncture site, and 18 ml of air was injected to inflate the

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balloon, following which sheath was removed. Removal of air was performed from the band at a rate of 1 ml/s until there was bleeding from the site, following which 2 ml of air was injected to attain the patent hemostasis. TR Band® deflation was performed after 2 h of CAG or 4 h of PCI by removing 3 ml of air every 10 min until complete deflation. The vesicles or bullae were treated by puncturing with a sterile 21G needle followed by deroofing and topical application of povidone-iodine ointment. There was a complete healing with neo-epithelialization in 11 of these patients within 3–4 days. One patient developed deep dermal necrosis of skin (Fig. 1C1), which required oral antibiotics and regular dressing for 2 weeks. The ulcer healed by secondary intention. Fig. 1C2 shows the wound healing after 7 days of the index event.

3. Discussion

Epidermal blisters are fluid-filled cavities within or beneath the epidermis. Depending on the size, it is called as either vesicles (<0.5 cm) or bullae (>0.5 cm). The pathogenesis of these blisters is due to allergy, spongiotic or lichenoid inflammatory reactions, infections, autoimmune-mediated processes, drug, or physical injuries. They are classified further into subcorneal, intraepidermal, and subepidermal, based on the location of the dermal/epidermal split. The possible etiology in our cases may be due to one of the following hypotheses:

a. Barotrauma by the dual balloon compressions
b. Prolonged compression beyond the standard recommended 2 h by the manufacturer
c. Allergy to the material of TR Band®—polyvinyl chloride
d. Allergy to the local anesthetics and cocktail medications
e. Injection of 3 ml of local anesthetics into intradermal and subcutaneous spaces
f. Formation of firm adhesion between the epidermis and polyvinyl chloride of TR Band® by few drops of leaked blood while pulling out the sheath, inside the TR Band®, which while deflating, pulls the epidermis making a split inside or beneath the epidermis.

The incidence of these epidermal blisters was 0.45% (12 per 2687 patients) over the time span of 25 months in our center. After discussion of this complication, it was decided to follow the following protocol for 6 months at our center.

Single-folded white gauze was kept in between the volar aspect of TR Band® and the skin, so that it would absorb the blood that seeps out during removal of the sheath. To prevent further blood soaking of gauze during patent hemostasis, instead of deflating till the appearance of active ooze from the site and inflating additional 2 ml of air, the Barbeau test was performed with pulse oximeter by compressing the ulnar artery and gradual removal of air until a good waveform appeared on the screen (Fig. 2 & Video-1). No blisters were noted in the last 6 months after adopting this new protocol. One advantage of using TR Band® is the visualization of the puncture site during hemostasis or deflation. By placing white gauze between TR Band® and skin, the puncture site cannot be visualized, although the status of hemostasis can be monitored by the bloodstain of the white gauze.
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4. Conclusion

Dermatological complications from simple vesicles to large bullae can occur during TR Band® usage. Rarely, even dermal necrosis and ulcers may develop. Placing gauze between the TR Band® and skin and eliminating the blood ooze during patent hemostasis by the Barbeau test prevent the development of blisters.

Conflicts of interest

All authors have none to declare.

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