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Case Report

Spontaneous uncoupling of microvascular anastomotic coupler device causing post-operative haematoma - salvage with re-coupling of the device: a case report

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ABSTRACT

We report here a case of spontaneous uncoupling of the microvascular anastomotic coupler device (MACD), commonly known as venous coupler, causing acute post-operative bleeding and haematoma in early post-operative period, in a patient with free muscle sparing TRAM flap. This was noticed as the patient suddenly abducted her right arm post-operatively while patient tried to get up in a bed. This acute emergency was salvaged by re-engaging the coupler rings, with a simple technique with reinforced 9-0 Nylon sutures, without the need for revising the entire anastomosis.

Keywords: MACD, Venous coupler, Spontaneous uncoupling of coupler device

INTRODUCTION

Free microvascular flaps are now common forms reconstructive surgery for practically all areas of body for achieving optimal reconstructive results in terms of form, function and aesthetics. Arterial and venous anastomoses are essential components of this procedure. Since first described anastomosis in 1960 by Jacobson and Suarea, the technique, sutures, instrumentation and microscopic equipment has evolved with time.[1] The gold standard for microvascular anastomosis has been hand sewing of the anastomosis. Several non-suture techniques have been tried to reduce the anastomotic time, risk of luminal narrowing, reducing the contact of suture material with vessel wall and reducing risk of thrombosis.[2] However, amongst these only the coupler technique has been in widespread practice. The concept of couplers with use of two interlocking rings was first introduced in 1962, and then it was further refined in 1986 by Ostrup and Berggren and improved to the standard of current Synovis microvascular anastomotic device (The Microvascular Anastomotic Coupler Device – MACD- Synovis Micro Companies Alliance, Inc., a subsidiary of Baxter International Inc.)).[3,4] Microvascular anastomotic coupler devices (MACD) are now commonly used in microvascular surgery.[5] Malfunction or failure of these devices are rare. Few late complications associated with coupler use have appeared in literature, such as foreign body sensation and migration.[6-8] Some cases of extrusion of the microvascular coupler devices have also been reported.[9,10] The only case of disruption of the microvascular anastomotic device was reported recently when it was noticed during surgery. The authors reported that the anastomosis was converted into a hand sewn anastomosis and the coupler rings were left in situ.[11] We believe that our case is the only reported case of spontaneous uncoupling of venous coupler in the post-operative period causing acute post-operative haematoma. We also have managed to recouple the coupler rings to salvage the anastomosis.

CASE REPORT

A 60-year-old lady initially presented to the senior author (DG) requesting bilateral breast reduction for severe macromastia and ptosis. Her body mass index (BMI) was

31.6. Pre-operative work up showed incidental ® breast invasive ductal carcinoma which was initially treated with lumpectomy. She was started in neo-adjuvant taxotere and cyclophosphamide (TC) chemotherapy for early breast cancer. After four cycles (4 months following right breast lumpectomy), she underwent bilateral autologous DIEP flaps reconstruction in conjunction with completion mastectomy on right side and prophylactic mastectomy on the left side. Both mastectomies were nipple sacrificing, skin sparing type. Since, she was noted to have multiple small perforators, the DIEPs were converted to muscle sparing TRAM (MS-TRAM) flaps bilaterally. The Mastectomy specimens weighed 990 gm for right and 920 gm for the left. The MS-TRAM flaps were used for ipsilateral breast reconstructions and weighed 700 gm for the right and 670 gm for the left. Both zones 1 and 2 were used for breast reconstruction partially burying flap with generous monitoring paddles inferiorly bilaterally. The ischemia time for right side was 46 min and for left side was 56 min. Ipsilateral deep inferior epigastric vein (DIEV) was anastomosed to the proximal end of the internal mammary vein on each side. Superficial inferior epigastric veins were preserved on both sides. After the DIEVs were anastomosed and clamps were removed, both superficial veins were found to be quite distended. Decision was therefore taken to use both superficial veins as second vein on each side and were anastomosed to the divided distal ends of internal mammary veins on either side.[12,13] All venous anastomoses were performed by 2.5 mm couplers (The Microvascular Anastomotic Coupler Device – MACD- Synovis Micro Companies Alliance, Inc., a subsidiary of Baxter International Inc.), in standard fashion. All arterial and venous anastomoses were uneventful. As usual, a small, curved mosquito artery forceps was used to compress the coupler rings once they are ejected by the device, to make sure that the coupler rings are well engaged. Patient recovered from surgery well and was transferred to the ward. Approximately 18 hours post-operatively, patient grabbed the ® handrail while trying to sit up in the bed, and instantly experienced some stretching sensation, in her right breast. This was followed by gradually increasing swelling in right breast. Urgent USG scan of right breast suggested 5×4×1.5 cm haematoma. Patient was returned to theatre for re-exploration of right breast. The exploration revealed uncoupled anastomosis of superficial epigastric vein and distal end of internal mammary vein causing active bleeding from the flap and was deemed to be the cause of haematoma. During surgery haematoma was evacuated from the right breast. We noted that both coupling rings were still attached to the vein ends. Since no more of 2.5 mm size coupler devices were available at the time, decision was taken to re-use the coupler rings which were already preserved on the vein ends. The venous ends were held in microvascular double vein clamps, and with micro-forceps, both ends were brought together and 're-coupled' under microscope 'free hand' without the need for loading device. The coupler rings have flatter opposing sides that slide into the grooves of the two jaws of coupler loading device on either side (Figure 1).

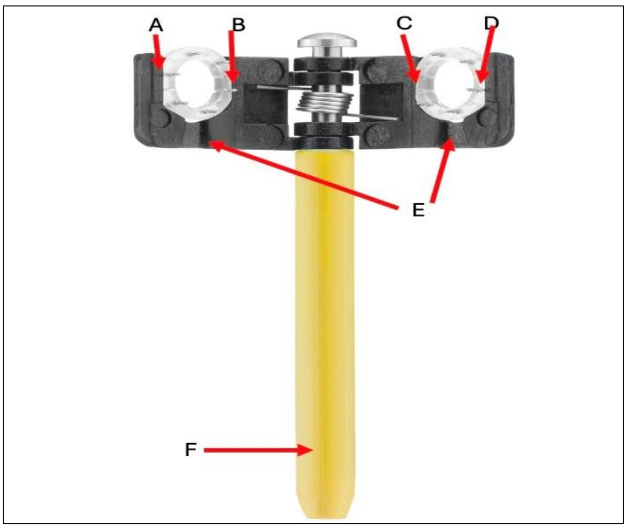

Figure 1: Microvascular anastomotic coupler rings loaded in the loading device - AB and CD: the rings on either side have opposing flatter sides which slide in or out of the loading device. We grasped these sides with microvascular forceps to re-engage the rings 'free hand'; E: the two jaws of the coupler 'loading device'; and F: cylindrical handle for closing the coupler rings and ejecting the device (photo without superimposed letters -ABCDEF, with permission from Synovis Micro Companies Alliance, Inc., a subsidiary of Baxter International Inc.).

Grasping the coupler rings at these flatter sides bilaterally with micro-forceps helped us align the coupler rings perfectly. Small mosquito artery forceps were again used to externally compress the two coupler rings under microscope magnification to help engage opposing spikes firmly. The clamps were released to confirm the patency. To prevent re-occurrence of such event, we used two 9-0 sutures on opposite sides around the coupler rings as re-enforcement. Wounds were closed as usual with a drain. Patient made uneventful recovery.

DISCUSSION

MACD or simply couplers have been in common use in microsurgery to save time in end-to-end venous anastomoses, since past 30 years approximately. Several studies have demonstrated common use of these coupler devices in microvascular surgery as well as their efficiency in breast, head and neck, extremities and other free flaps.[14] One of the largest studies of 1000 cases suggested incidence of thrombosis with couplers being 0.6% which is comparable or better than standard suture techniques.[15] Although these devices were initially used for end-to-end venous anastomoses, they are now also being used for end to side venous anastomoses.[16] Couplers have also been used in micro-arterial anastomoses.[17] The current coupling device consists of two disposable rings made of high-density polyethylene, with a series of six to eight (depending on the size of the coupler) stainless steel pins evenly spaced around each ring. The rings are

manufactured with inner diameters that range in size from 1.0 to 4.0 mm, allowing anastomoses of vessels that are 1.0 to 4.5 mm in diameter. During venous anastomosis, the coupling device consisting of two rings is loaded onto a 'loading device' (Figure 1). Each vein end is gently everted by surgeons over the respective coupler ring held by the spikes. The jaws of the loading device (Figure 1E) are brought together by clockwise rotation of the cylindrical handle (Figure 1F). Once the spikes of the two coupler rings are engaged well, further rotation of the handle 'ejects' the coupling device, with two coupler rings engaged together. A small artery forcep is used to gently compress the two rings to further engage the spikes firmly. The clamps are then opened to check the anastomosis.

In our unit, we use couplers regularly for venous anastomoses and currently, we rarely hand sew any end-to-end venous anastomoses. We present this unusual case as we have not experienced spontaneous uncoupling of this device in our unit. We believe that sudden abduction of the right arm caused the spontaneous uncoupling of the venous coupler. Extensive literature search revealed a solitary publication during which a coupler device disruption was noticed during a lower limb free flap surgery. The authors mentioned that they noticed disruption prior to wound closure on table. They also mentioned that they tried to remove the coupler rings but could not disengage them from vein ends. They proceeded to revise the end-to-end venous anastomosis by hand sewing it and left the coupler rings in situ.[11] It is unclear from their publication, if they attempted re-using the coupler device. In our patient, we were able to recouple the device safely. In our opinion, attempts to remove the coupler rings from venous ends may cause further trauma to the delicate vessel walls. We also choose to use a couple of 9-0 Nylon sutures around the coupler rings, which we found to be a relatively easy step to prevent recurrence.

CONCLUSION

We present here an unusual case of spontaneous delayed uncoupling of the microscopic venous coupling device causing acute haematoma in breast in the early post-operative period after MS-TRAM flap reconstruction. We were able to re-use the coupler device by free hand 'recoupling' of the device reinforced by a couple of 9-0 Nylon sutures, avoiding the need for complete revision of the vein anastomosis or hand sewing the anastomosis.

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