A Simple Shunt Tube Management Technique during Beating-Heart Coronary Artery Bypass Grafting

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We report a simple technique, which we term “wakka technique”, for management of the intracoronary shunt tube during beating-heart coronary artery bypass grafting. The shunt tube itself aids in maintaining a clear surgical view, as the shunt tube tag tends to wander and interfere with the anastomosis. Our technique is simply to pass the shunt tube tag through a loop of string, and to hold in appropriate position. This simple technique provides a comfortable anastomosis by locating the interfering tag away from the operative view, without any risk at no extra cost.

KEY WORDS: beating heart operation, coronary artery bypass grafting, intracoronary shunt tube

I. Introduction

Intracoronary shunt tube, first reported by Rivetti and Gandra (1), has been widely used. It is useful for maintaining a clear surgical view in beating-heart coronary artery bypass grafting (CABG), however, the tag of the shunt tube tends to wander and interfere with the anastomosis process. Although every surgeon has their own way to manage the shunt tab, no particular management techniques have been reported. We herein report a simple technique, which we term “wakka technique”, for management of the intracoronary shunt tube during beating-heart CABG anastomosis.

II. Technique

From April 2013 to December 2016, 126 isolated CABG procedures were performed at our institution, and all of these patients underwent surgery under beating-heart conditions, with 109 performed as off-pump condition. During the same period, 65 CABG procedures were performed as a concomitant operation, and all were also performed under beating-heart conditions. Of these, all anastomoses to the target vessels at the lateral, posterior, or inferior wall, namely, anastomoses need heart rolling or twisting maneuver, were performed with the described technique for shunt tube management.

An intracoronary shunt tube (during 2013–2014, Clearview intracoronary shunt, Medtronic Inc., Minneapolis, MN, USA; 2015-present, MINI SHUNTPRO, Fuji Systems Corp., Tokyo, Japan) was gently inserted into the incised coronary artery. Our technique is simply to pass the shunt tube tag through a loop of string (2-0 braided silk), which we termed “wakka” (Fig. 1), and the free ends of the loop are held by mosquito forceps. Wakka means “a loop” in Japanese. Since the shunt tube tag is just passed into the loop, we can easily remove it whenever we do not need it. The wakka string can be cut to a suitable length and held in appropriate position with mosquito forceps fixed to a surgical towel, or put to the string holder of a sternal retractor. Because there is a risk of shunt falling off, it is better to fix the wakka string without applying the weight of the mosquito forceps. As the anastomosis progresses, the direction of the wakka string should be changed. Because we usually sew up from heel to toe, the tag is placed in the direction away from the suturing site at the beginning and the middle phase of the anastomosis, and in the direction toward the apex at the final phase of the anastomosis (Fig. 2a and b). Holding direction of the wakka should be devised as the surgeon’s suture style. The shunt tube is completely under the surgeon’s control through the entire process of the anastomosis. This simple technique provides a comfortable anastomosis environment without interference from a wandering shunt tube tag, with no extra cost.

III. Discussion

Because simple revascularization is frequently performed with...
percutaneous coronary intervention (PCI), multiple coronary artery revascularization has been indicated for surgical treatment. Favorable results have been reported with surgical revascularization for these multi-vessel candidates, compared to those who undergo PCI. Thus, the frequency of anastomosis to the target vessels located at the lateral, posterior, and inferior wall has increased. In Japan, the rate of beating-heart CABG, including both off-pump coronary artery bypass grafting (OPCAB) and on-pump beating CABG is relatively high. Almost 80% of CABG procedures were performed under beating-heart conditions, and nearly 65% were performed as OPCAB. Under beating-heart conditions, effort to maintain a bloodless surgical field is necessary for high-quality anastomosis. A bloodless field can be achieved with temporary closure of the lumen of the coronary artery with a snare or clamp. However, the impact of ischemia during the anastomosis is not negligible. The risk of adverse events, such as ventricular arrhythmia, hypotension, myocardial reperfusion injury, and myocardial infarction is significant.

An intracoronary shunt tube has been widely used because it can provide a clear surgical field without ischemia. On the other hand, the plastic tag of the shunt tube tends to wander and interfere with the anastomosis process particularly in anastomoses to the target at the lateral, posterior, and inferior wall. Some surgeons cut off the tag to avoid being distracted by the wandering tag. However, this presents the risk of device loss and the surgeon will still be distracted by a short string tied to the shunt tube. Some surgeons hang the tag on a stabilizer. The tag usually slips down from the stabilizer as the heart beats. Although many coronary surgeons are dissatisfied with behavior of the shunt tube tag during the anastomosis process, there are no previous reports describing shunt tube tag management. With our simple technique, the shunt tube is completely under the surgeon’s control through the entire process of anastomosis without any risk, at no extra cost. The surgeon can concentrate on the anastomosis without the distraction of the shunt tube tag.

IV. Conclusion

Our simple technique for shunt tube tag management enables a comfortable anastomosis. It is economical, very easy to perform, without any risk, and can be a useful technique in beating-heart CABG.

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Disclosure Statement
The authors have no conflicts of interest to declare.

References
1) Rivetti LA, Gandra SM: Initial experience using an intraluminal shunt during revascularization of the beating heart. Ann Thorac Surg 1997; 63: 1742–1747
2) Mohr FW, Morice MC, Kappetein AP, et al: Coronary artery bypass graft surgery versus percutaneous coronary intervention in patients with three-vessel disease and left main coronary disease: 5-year follow-up of the randomised, clinical SYNTAX trial. Lancet 2013; 381: 629–638
3) Verma S, Farkouh ME, Yanagawa B, et al: Comparison of coronary artery bypass surgery and percutaneous coronary intervention in patients with diabetes: a meta-analysis of randomised controlled trials. Lancet Diabetes Endocrinol 2013; 1: 317–328
4) Committee for Scientific Affairs, The Japanese Association for Thoracic Surgery, Masuda M, Kuwano H, Okumura M, et al: Thoracic and cardiovascular surgery in Japan during 2013: Annual report by The Japanese Association for Thoracic Surgery. Gen Thorac Cardiovasc Surg 2015; 63: 670–701