



Management of bleeding in advanced endoscopic procedures

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Abstract

Endoscopic mucosal resection and endoscopic submucosal dissection are used for the treatment of early gastrointestinal tract cancers. Bleeding is one of the most common complications encountered when performing these procedures. It is more common in gastric cases than in esophageal and colorectal cases. It is important to take measures before, during and after the procedure to mitigate the risk of bleeding. Patient history should be carefully questioned for bleeding tendency, the use of medications which may potentiate bleeding and the presence of a condition known to increase the risk of bleeding. In the case of bleeding during the procedure, a knife, coagrasper, hot biopsy forceps or hemoclip may be used. Although bleeding is a common complication in advanced endoscopic procedures, it can be easily managed in experienced hands and effective intervention methods.

Keywords: endoscopic mucosal resection, endoscopic submucosal dissection, bleeding, gastrointestinal tract

1. Introduction

Endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) are advance endoscopic procedures used for the treatment of early gastrointestinal tract cancers. EMR has been in use for many years due to its convenience, short duration of procedure and low cost. However, inability to perform en bloc resection in large lesions, limitations of histological evaluation and the high probability of cancer recurrence prompted research efforts for alternative modalities, culminating in the development of ESD applications. These newer modalities allowed removal of early stage lesions of the gastrointestinal tract in one piece and thus, reduced the need for surgery. Advances in endoscopic devices led to detection of an increased number of early stage gastrointestinal tract lesions and improved detection of lesions led to increased use of EMR and ESD procedures. However, these advanced procedures were also lead to an increase in the number of patients with complications. Therefore, it is crucial to have a good knowledge of potential complications before performing advanced endoscopic procedures and care should be taken to avoid complications during the procedure and to recognize them early and treat effectively.

Bleeding is one of the most common complications encountered when performing advanced endoscopic procedures. Post-EMR bleeding has been reported at a rate of 1.2% in esophageal lesions, 0.1-5.3% in gastric lesions and 2.3-3.5% in colon lesions (Tomizawa et al., 2013; Ono et al., 2016; Fukami, 2019). ESD procedures have been associated with bleeding rates of 0-0.7% in esophageal lesions, 0-15.6% in

gastric lesions and 0.4-5.7% in colon lesions (Kataoka et al., 2016; Ono et al., 2016; Fukami, 2019).

Bleeding is classified into two categories including immediate (intra-procedural) bleeding and delayed (post-procedural) bleeding. Delayed bleeding may occur within 30 days after the procedure. While it is quite easy to recognize bleeding during the procedure, delayed bleeding is considered when there is substantial bleeding or the diminution of 2 g/dL in hemoglobin value (Tajiri and Kitano, 2004). It is important to take measures before, during and after the procedure. Patient history should be carefully questioned for bleeding tendency, the use of medications which may potentiate bleeding and the presence of a condition known to increase the risk of bleeding. The blood type should be determined prior to the procedure in patients at risk for bleeding. The knives used for the procedure, the type of vascular intervention and the procedure technique may affect the development of hemorrhage. It is recommended that the endoscopist performing ESD be experienced in the control of bleeding events (Yamamoto et al., 2009). Such expertise would greatly contribute to successful completion of procedure in patients with bleeding.

At the time of the procedure, the patient should be assessed as a whole and supported with parenteral fluids if excessive blood loss is anticipated in extended procedures. In advanced endoscopic procedures, early management of bleeding prevents falling in blood values and ensures a safe and high-quality procedure (Oda et al., 2005; Toyonaga, 2006). Since

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the bleeding is managed in a short time, bleeding that is severe enough to require replacement does not occurring such patients. While it is recommended to cut small submucosal vessels with a knife in the coagulation mode in order to avoid impairment of the endoscopic view due to bleeding, coagulation of the blood vessel with a coagrasper followed by dissection is recommended for large submucosal vessels. The cut-off vessel thickness for coagrasper was reported as 1 mm in some studies and 2 mm in others. Figures 1, 2, and 3 show submucosal area and submucosal vessels visualized during ESD.

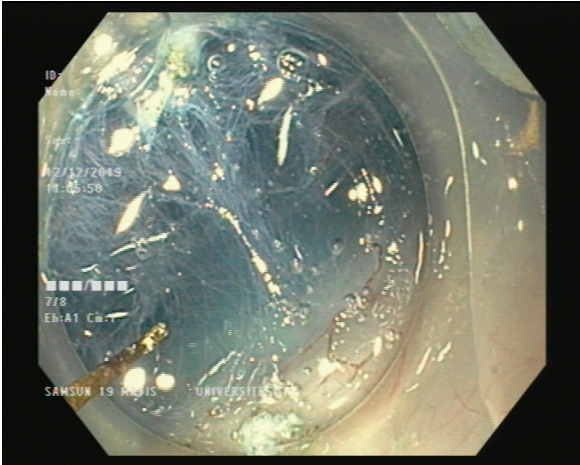


Fig. 1. The appearance of submucosal area during ESD

In the case of bleeding during the procedure, a knife, coagrasper, hot biopsy forceps or hemoclip may be used. The operation modes to be used to manage bleeding in advanced endoscopic procedures should be adjusted according to the instructions for use of the cautery device taking into account the site of bleeding, and knife or coagrasper used. Prior to performing coagulation with a knife, coagrasper or hot biopsy forceps, visualization of the focus of the bleeding and intervention to that site provides effective bleeding control and also decreases the risk of perforation. For this purpose, the endoscopes used for advanced endoscopic procedures have a water-jet canal which provides a clear view of the focus by flushing the bleeding site. Uncontrolled minor bleeding may impair the clarity of endoscopic view, resulting in increased complications. For lesions requiring the use of a hemoclip, care should be exercised to ensure that the site is dissected and clipping does not interfere with continuation of the procedure. Otherwise, there may be a possibility of residue in the clipped area (Takizawa, 2015).

There are some endoscopists who advocate addition of diluted adrenaline into the solutions used for mucosal elevation since it reduces the risk of intra-procedural bleeding. However, others claim that since adrenaline reduces bleeding during the procedure, the focus of bleeding may be overlooked and bleeding starts again after the hemostatic effect of epinephrine is lost. In ESD procedures, bleeding is more common in gastric cases than in esophageal and colorectal cases (Takizawa, 2015). As submucosal arteries located in the proximal and

middle sections of the stomach have a larger diameter, bleeding occurs more commonly in ESDs of these sites (Toyonaga, 2006). The frequency of bleeding increases with greater lesion size (Toyonaga, 2006). However, delayed bleeding is more common in ESDs of distal stomach compared to proximal and middle sections (Oda et al., 2005). The lesion size (Okada et al., 2011), advanced patient age and longer procedure time have been shown to be associated with a higher risk of bleeding. Blood transfusion is rarely needed (Takizawa, 2015). Although it has been reported that a follow-up gastroscopy on the day after gastric ESD decreases the likelihood of delayed bleeding (Goto et al., 2010), it is not widely accepted for routine use. Nasogastric intubation was suggested to be useful in the early detection of bleeding (Takizawa, 2015).

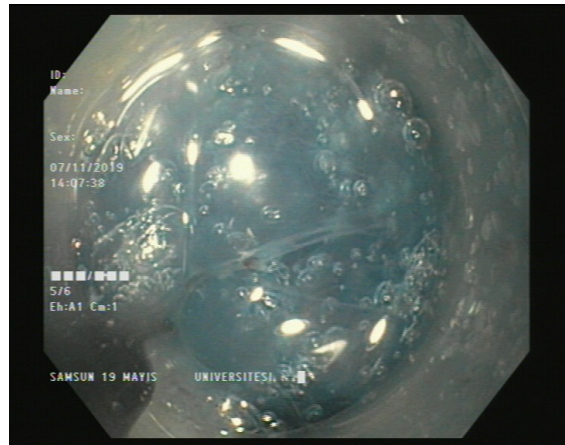


Fig. 2. The appearance of small submucosal vessels during ESD

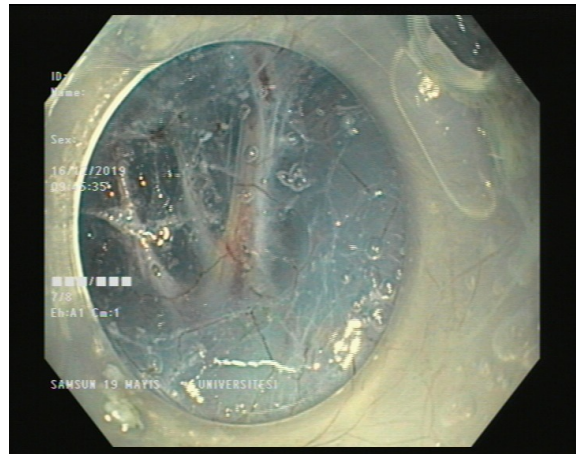


Fig. 3. The appearance of large submucosal vessels during ESD

Active bleeding should be suspected in a patient with hematemesis and/or hematochezia /melena and vital findings of the patient should be assessed rapidly along with hemoglobin/ hematocrit monitoring and the site of ESD site should be inspected endoscopically. In general, the use of APC is not recommended in post-ESD bleeding due to difficulty in controlling the coagulated region. Approaches to bleeding vary in relation to the time from ESD. While coagulation with a coagrasper and hemoclip use are recommended for early bleeding because of the softness of post-ESD ulcer, injection treatment is advised for bleeding that develops after the formation of granulation tissue (Oda et al., 2013).

H2 receptor blockers or proton-pump inhibitors (PPI) have been demonstrated to be effective in ESD ulcers although data on their superiority are variable (Yamaguchi et al., 2005; Uedo, 2007). Additionally, administration of a proton-pump inhibitor before the procedure was reported to reduce the severity of pain. At our clinic, patients undergoing ESD are given PPIs via intravenous route one hour before the procedure and ESD ulcer is coated with sucralfate after the procedure. Liquid foods are initiated the next day and PPI therapy is given twice daily within the first month and once daily for the following two months. These patients also receive eradication therapy for *Helicobacter pylori* if it is present.

Another consideration for bleeding in advanced endoscopic procedures involves patients receiving antiplatelet and anticoagulant therapies. EMR and ESD are endoscopic procedures that carry a high risk of bleeding. Therefore, such patients should be evaluated in terms of the risk of thromboembolism before the procedure and the doses of their medications should be adjusted before, during and after the procedure through consultation with the physician treating the

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- patient. Current guidelines recommend discontinuation of other antiplatelet drugs for a specified period before the procedure and the use of aspirin or cilostazol if antiplatelet therapy is mandatory. For patients taking warfarin as oral anticoagulation therapy, normalization of prothrombin time or switch to a direct oral anticoagulant may be advised. However, direct oral anticoagulants also need to be discontinued before the procedure depending on their duration of action. The treatment may be resumed after confirmation of hemostasis endoscopically after the procedure (Tanaka, 2020).

2. Conclusion

In conclusion, although bleeding is a common complication in advanced endoscopic procedures, it can be easily managed in experienced hands and effective intervention methods.

Conflict of interest

None.

Acknowledgments

None.

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