How to manage large colorectal polyps: EMR vs. ESD?

Key messages:
1. Most normally sized colonic lesions can be removed by snare polypectomy or EMR.
2. In the case of larger lesions, endoscopic resection is quicker, safer and cheaper than surgical resection.
3. The advantage of ESD is that a single fragment resection potentially allows for a more confident histological diagnosis.
4. The disadvantages of ESD include a more prolonged procedure with higher cost and greater hazards.
5. A major revision of Endoscopy training will need to be implemented before ESD can be embraced in the West.
6. The introduction of ESD is only one of the many benefits such a change could lead to.

Learning objectives:
1. To highlight the advantages of EMR and ESD over surgical resection
2. To contrast the advantages of EMR and ESD
3. To compare the disadvantages with the two techniques

Abstract:
Background
Although most smaller colonic polyps are removed by snare polypectomy or EMR, there is evidence from the British Bowel Cancer Screening Programme that many larger lesions are referred for surgical resection. However, there is a significant morbidity and mortality associated with the surgical treatment, with published 30 day mortality rates varying between 1% and 8% 1. In addition, surgery is expensive. In the UK, the treatment of colonic cancer accounts for more hospital in-patient expenditure than cancer of any other site.

In contrast to surgical resection, endoscopic resection allows larger lesions to be removed with a minimum of cost, morbidity and mortality 2,3,4. Most early gastric and colonic cancers are therefore now removed by EMR or ESD in Japan 5.

The techniques of EMR and ESD
Several methods of EMR have been described. Most commonly it is the “strip biopsy method” which employed. With this technique a solution is injected into the sub mucosa below the lesion. This creates a “cushion” and provided a safe medium to use a snare to undertake polypectomy.

Different EMR solutions have been described. In Leeds, we use an EMR solution of containing 40 ml of volplex (succinylated gelatine), 2 ml of adrenaline and 2.5 ml of indigo carmine. The volplex creates a longer last lift than saline and the adrenaline reduces annoying oozing from small veins. It is noteworthy that the adrenaline in the EMR solution does not reduce the risk of delayed bleeding 6.

Inclusion of Indigo carmine dye into the solution allows the extent of lift to be ascertained. Hydroxypropylmethylcellulose7, hyaluronic acid8 and dextrose9 all give even more prolonged and effective sub mucosal lift.

“The pull within the snare” (“grasp and snare”) technique uses a grasping forceps to pull then lesion into the snare. This technique allows otherwise unresectable or poorly lifting lesions to be removed. However, the pull within the snare technique has been associated with a higher risk of perforation 10.

Endoscopic submucosal dissection
Endoscopic submucosal dissection (ESD) allows difficult lesions to be resected “en-bloc”. The technique was originally developed in Japan for the removal of early gastric cancer. The procedure is carried out using a specially designed electrosurgical knife (Insulation Tip knife). Several other such knives are available. As yet there is no consensus on the best knife to be used in the colon. The key features of this technique are to first make an incision around the lesions. The lesion is then dissected through the submucosal plane using a knife and a hood attached to the end of the endoscope. The advantages of ESD include the provision of a single sample allowing for more accurate histological analysis and a lower risk of recurrence. The disadvantages include the fact that this is a more complex technique, requiring greater experience, longer procedure times, a higher risk of complications, the need for admission and the availability of specialised equipment including carbon dioxide insufflation and, usually in the West, general anaesthesia with all that this entails.

Comparison of EMR vs. ESD
ESD usually provide a greater chance of completely removing the colorectal lesion and therefore a lower local recurrence rate. A recent comparative study 11 demonstrated the higher en bloc resection rate of 83.5% with colorectal ESD compared with 48.1% for lesions removed by EMR.

However in this study, ESD was associated with a greater risk of perforation than when lesions were removed by EMR (5.9% v 0%). This was confirmed in an analysis of 17 case series (n=1858) in which the overall risk of perforation complicating an EMD was found to be 0.2% 12. This risk was greater than the risk of perforation associated with snare polypectomy (0.13%) but not as great as the risk associated with ESD 13.
A recent publication from France reported an even greater perforation rate (at 18%) when lesions were removed by ESD in Europe. The published risk of mortality after colonic perforation has been reported to be as high as 5%. The risks are greater when the bowel contents enter the peritoneal cavity. Small perforations can be closed by placing endoscopic clips; however, this requires expertise in recognising the micro-perforation and in closing the defect. Furthermore, to minimise the risk of faeculent contamination of the peritoneum the colonic lumen must also be absolutely clean for these procedures.

The risk of significant bleeding is greater with colorectal ESD than with EMR. However, many other factors influence this risk, and probably to a greater degree. Such factors include older age, presence of co-morbidities, number of polyps, larger polyps, sessile polyps and poor quality of bowel preparation (probably a proxy marker for age and comorbidity). Anticoagulation and anti-platelet therapy (apart from simple aspirin) increases the risk of delayed rather than immediate bleeding. In a retrospective study of polypectomy of small polyps (average size= 5mm) demonstrated that this could be carried out safely without the need to stop warfarin provided that the mucosal defect was closed with a clip. However, in the case of ESD, all anticoagulation and anti-platelet therapies are stopped. In Leeds, patients may continue on aspirin even when large lesions are removed by EMR.

Indications for colorectal ESD
In view of the increased cost and complication rate associated with ESD, the National Cancer Center Hospital, Tokyo, Japan (NCCH), advises that ESD is reserved for the following colorectal lesions; a)
- LST Non granular type >20 mm
- LST granular type >50 mm

Table I. Comparison of EMR and ESD

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<thead>
<tr>
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<th>EMR</th>
<th>ESD</th>
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<tbody>
<tr>
<td>Cost</td>
<td>Cheap</td>
<td>Expensive</td>
</tr>
<tr>
<td>Technique</td>
<td>Less complex</td>
<td>More Complex</td>
</tr>
<tr>
<td>Duration</td>
<td>Relatively shorter</td>
<td>Longer procedure</td>
</tr>
<tr>
<td>Bleeding Risk</td>
<td>&lt;1%</td>
<td>2%</td>
</tr>
<tr>
<td>Perforation Risk</td>
<td>&lt;1%</td>
<td>5-18%</td>
</tr>
<tr>
<td>Need for In-patient care</td>
<td>Not usually needed</td>
<td>Up to 5 days normally.</td>
</tr>
<tr>
<td>Need for CO2 insufflation</td>
<td>Not needed</td>
<td>Needed</td>
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<tr>
<td>Sedation</td>
<td>Conscious sedation/rarely GA</td>
<td>In Japan conscious sedation/rarely GA but in the West most procedures are probably conducted under GA</td>
</tr>
<tr>
<td>En-bloc resection</td>
<td>Not possible if piecemeal EMR</td>
<td>Usually possible</td>
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Conclusion
Many surgical and histology departments have concluded that piecemeal resection of rectal lesions is no longer acceptable. This is the reason why my surgical colleagues in Leeds are favouring trans-anal single fragment resection over piece-meal EMR.

However, if “single-fragment resection” is the correct procedure in the rectum, it must be the way ahead elsewhere in the gastrointestinal tract.

Moving from EMR to ESD will have far reaching implications. As the risk of lymph node metastases is very low with T1 colorectal cancers, a move to ESD means that all small colorectal cancers should first be resected endoscopically. Lesions which after histological analysis is found to contain lymphovascular invasion, poor differentiation or extensive tumour budding would then proceed to colectomy.

Single-fragment resection involves specialised experience which will require thousands of hours to develop. In this future, it will no longer be possible to be a “Jack of all trades” and, within the “European Working Time” directive, there may not be sufficient time to develop and maintain expertise in Endoscopy as well as Gastroenterology.

Even within Endoscopy, further sub-specialisation will have to be developed. You and your team may provide an excellent ESD service but unless you have also dedicated thousands of hours honing your resection skills, your single-fragment resection service will be substandard.

In this “Brave New World”, stakes will be higher. A perforation suffered during the resection of a benign lesion may result in a couple of days on antibiotics in hospital after endoscopic closure. However, if the perforation complicates the resection of a small cancer, dissemination of cancerous cells throughout the peritoneum may result.

References:
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