Education Special: Electrosurgery and Polypectomy

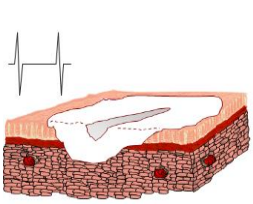
The most common use of electrosurgery in flexible endoscopy is for the resection and removal of polyps. Most of these are located in the colon.

The National Polyp Study (New England Journal of Medicine, 2012) suggested that the colonoscopic removal of adenomatous polyps reduced colon cancer mortality by 53%. The benefit of screening colonoscopy and polypectomy is well accepted, and polypectomy is considered generally safe. The overall rate of polypectomy complications is low. In various reports, complications include mild to severe immediate bleeding, delayed bleeding, post polypectomy syndrome, and perforation.

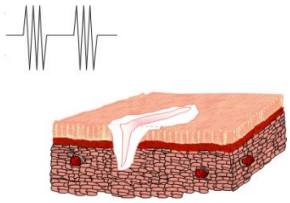
Polyp removal can be done via 'cold' mechanical cutting with no electrosurgical energy, 'hot' snare or forceps resection, or by a combination of cold sampling with application of thermal energy either to treat immediate bleeding or to effect complete ablation. At least one paper has suggested that the removal of diminutive polyps exclusively with cold biopsy forceps may be inadequate (Efthymiou, 2011). Predictors of complications tend toward patients being treated with anticoagulants, large polyp size or polyps located in the cecum or areas difficult to access. Since the use of electrosurgery is nearly ubiquitous to eradicate polyps, especially those greater than 2mm, it behooves clinicians to gain the best possible understanding of the fundamentals of the technology and how to apply those fundamentals to polyps of all kinds and sizes to achieve the most successful outcomes.

A key facet of electrosurgery (the use of high frequency energy to both 'cut' and coagulate tissue) to understand is the concept of current density. A popular analogy to visualize this concept is to think of one hot dog in a microwave or ten. Given the same time and power, the one may be exploded, shriveled and inedible while the ten are equally unappealing as they are barely warm. Power applied to a diminutive polyp, or a small one with a very slender stalk, will have a higher current density than spreading the same amount of power over a broad based or very large polyp. The resection of the small polyp will be accomplished faster. This observation is equally important because the time of current flow is a component of total current density. Limiting flow time limits the total thermal spread. Speed of the resection and amount of coagulation is also dependent on the rate at which the operator closes the snare. The ideal is to use a 'loose and smooth' closing action timed to give good coagulation, especially in thick stalks, while avoiding too much thermal damage, especially on small flat polyps.

The design of the waveform chosen is a predictor of tissue effect. Singh(2004) reported that 46% of gastroenterologists used a standard 'coag' waveform for polypectomy, while another 46% used a "blend coag".



COAG



BLEND COAG

Graphic relative depictions of how changing the waveform influences the amount of thermal injury.

In practice, the power range needed to achieve effective resection, hemostasis and ablation of all polyps is not large. For these most common waveforms, power settings in watts commonly vary only between about 15 and 25 watts.

A smaller percentage of physicians choose to use pulsed cut type waveforms. With few comparative studies and no robust, evidence based data, the optimum choice of waveform selection is left with the physician. (ASGE Technology Status Evaluation, 2013)