How to Use Electro Surgery during Digestive Endoscopy, Principles and Day-to-Day Practice, Balance Intensity-Duration is of Paramount Importance and must be Adjusted, According to the Aimed Destruction

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Keywords: Electrosurgery; Polypectomy; Snare; Hot biopsy forceps; Colonic and rectal cancer; Biliary sphincterotomy; Radic proctitis; Electrocoagulation

Introduction

The recent Guidelines of ESGE [1] describe the present, common use of electrosurgery for endoscopy.

These concepts explain the high percentage of complication and failure of electro-surgery during digestive endoscopy.

Coming back to good conceptions can be very useful, especially for young, specialized, digestive endoscopists. As a matter of fact, understanding high frequency currents properties leads to choosing the adapted balance intensity-duration fitting each use to reach the highest probability of efficiency and the lowest of complications.

Basic Conceptions

Before recent hyper-specialization, endoscopists were used to perform also open surgery. So, they knew intuitively the basic rule: low “intensity” leads to a slow, deep coagulation. High intensity leads to a superficial carbonization. Duration was to be adjusted, according to the macroscopic effect.

In fact, high frequency currents physics [2,3] imply some characteristics.

First, “resistance” as regards high frequency current, is very different of that concerning continuous current and should be expressed as impedance and not as resistance. It should also be noticed that intensity is not the same, according to the location through cross section, current flowing preferentially in surface.

Desiccation induced by coagulation increases impedance, rerouting the current through non-coagulated path-ways, especially if applied by successive short bursts. It is an important point, especially as far as Hot Biopsy Forceps Polypectomy (HBFP) is concerned [3].

It is trivial for surgeons who operate on open wounds, that high intensity leads to bad coagulation of vessels, owing to too a superficial action of current, consequence of the steep increase of impedance, secondary to carbonization. On the contrary, good, deep, efficient coagulation necessitates lower setting and longer time, according to the thickness of grasped tissues [4,5].

Polyps- Sessile, HBFP

For polyps, the task is destruction of mucosa which is superficial, lacking large vessels and not of sub-mucosa, rich in arteries. Therefore, haemostasis is not a problem and recommending the lowest power setting possible is dangerous because this method is safe only if application time is short. Consecutive low total energy transfer to tissues explains the high percentage of failure for HBFP, together with single pulse.

On the contrary, if enough heat is transferred, low intensity implies a longer application time and, therefore, a deep heating, explaining perforation and late bleeding, as well.

Safety is not always born of caution. In the present case, it is the contrary!

It must be also underlined that sucking-off colonic air increases wall thickness in all cases, all the more so sub-mucosa is elastic, like sub-cutaneous tissue of dog. It eases tenting, increasing the distance between HBF and muscularis propria and must avoid, therefore, any perforation. Tenting leads also to the appearance of a pseudo-pedicle concentrating the current and lessening the total output of energy delivered. As a matter of fact, despite approximately 40,000 HBFP, I failed to elicit any perforation since 1983 (no sucking off at that time). Delayed bleeding is limited to once every thousand HBFP of polyps, up to 15 mm. Efficiency is more difficult to assess. Approximately every hundred follow-up colonoscopy, I find a diminutive polyp on the scar of earlier HBFP. Only one interval cancer has been noticed. Therefore, efficiency seems to be good.

I use forced coagulation 80 w maxi, effect 4 or 80 w forced on ICC 200 during a total time, one second maximum, just enough to whiten the angulated junction between polyp and normal mucosa.

Polyps: snaring

Pediculated: As far as stalks are concerned, hemostasis is the task, avoiding burning the wall, as a secondary purpose. The risk lies in the central artery which must be coagulated before transection. Coagulation is to be adapted to diameter of the stalk (from 20 to 80 w, ICC 200) to obtain a relatively constant density of current.

Operator must tighten the snare himself, initially slightly to allow surface coagulation, heralded by whitening. If stalk is thin, it's enough. Current flows preferentially through the vessels because of lower impedance. In case of desiccation, mucosa retracts over sub-mucosa like the sheet of a rope over its core. Intense, pure cutting current overcomes then the high impedance.

If stalk is thicker, it is wise to tighten cautiously and relax abruptly the handle, as soon as cutting starts. Further coagulation without tension allows easy and safe coagulation of central artery before ending cut.

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Received September 01, 2013; Accepted February 03, 2014; Published February 10, 2014


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In case of a large and short pedicle, difficulty and risk are at the maximum. Endo-loop is rarely a solution because of slipping. Deep infiltration of pedicle with any necrotizing agent, like hypertonic saline, glucose or 90° alcohol allows thrombosis of central artery, heralded by the change of color of polyp’s head, and a further, safe, quick section.

In case of a very large polyp, large contact with opposite wall lessens diffusion of current in pedicle and basis and allows macro-biopsy with strong tension of snare and 60 to 90 w, forced coagulation (ICC 200).

It is then easy to assess resectability, according to the base which becomes clearly visible.

If not, macro-biopsy confirms frequently cancer and justifies surgery. If it is resectable, it is possible to apply the above-mentioned method.

For intermediate polyps, traction elicits a thinner pseudo-pedicle, particularly easy and safe to cut or coagulate.

Sessile or flat: Finally, sessile and flat polyps can be quickly and easily resected by the “suck-and-cut” technique described by N Soehendra. Put a stiff snare over the polyp (if 20 mm or less to avoid trapping muscle), suck off air. Polyp climbs into the snare. Close it. Insufflate to check the quality of grasping. Suck-off. Tighten strongly the snare and cut with high intensity coagulation, as above. Section is clear-cut, without bleeding and perforation. However, warn patient to say immediately “Ouch” or anything else, in case of any pain.

As a matter of fact, pain means serosal heating and implies stopping immediately coagulation and tension on snare. Twice, it led to simple secondary “peritoneal heating”. With the present method, I failed to have a single perforation among large polyps during 35 years. Late bleeding frequency is almost the same as with HBFP. The only case of complications over a 35 year-long period provides strong evidence favoring the diffusion of these principles.

The same technic can be used for polypectomy or macro-biopsy in stomach. Duodenal polyectomy poses peculiar problems.

Automatism is like caterer: better than a bad cook but worse than a good one!

ERCP: However, “Endocut” is useful for biliary sphincterotomy. Bleeding is very rare and it does not increase pancreatitis frequency. In case of any bleeding, coagulation with the cutting wire at 60 w is efficient.

Cancer: Electro-surgical devices can also be used for destruction of cancers, rectal and, in selected cases, colonic. Task may be symptomatic and precautions. Gastrointest Endosc 20: 9-12.

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References