Submucosal Injection Polypectomy (SIP) Technique for the Removal of Polyps

Jerome D. Waye, MD
New York, USA

Injection of fluid into the submucosa beneath the polyp will increase the distance between the base of the polyp and the serosa. When current is then applied via a polypectomy snare, the lesion can be more safely removed because of a large submucosal "cushion" of fluid, which lessens the likelihood of thermal injury to the serosal surface.

The colon wall is 1.5 to 2.2 mm in total thickness, and thermal damage to deep layers of the colon can easily occur [1]. The submucosal injection technique can be used for removal of sessile adenomas, whether small or large [2, 3, 4].

The fluid, injected through a long and stiff sclerotherapy needle, may be saline (normal or hypertonic)[5], with or without methylene blue to enhance visualization and with or without epinephrine[6]. Most endoscopists use normal saline only. The use of hypertonic solutions and epinephrine are intended to retain the fluid at the injection site for a longer period, but blebs of plain isotonic saline last for ten to fifteen minutes, which is sufficient time for removal of most polyps.

A viscous mucinous solution of 0.5% sodium hyaluronate has been used (via a 21 gauge needle) to elevate large flat polyps for endoscopic mucosal resection [7]. This solution is isotonic and lasts longer than saline injection. Further studies need to be performed to assess the practicality of this injection solution.

There is a theoretical advantage to the injection of dilute epi-nephrine (at a proportion of 1:10,000, 1:20,000, or 1:10,0000), to prevent bleeding at the time of polypectomy or to prevent delayed bleeding. However, the incidence of immediate bleeding during polypectomy is low (1 out of 100 procedures) [8], and the long-term effect is nil because the action only persists for hours, not days.

The injection needle may be placed into the submucosa just at the edge of a polyp, or if the polyp is large and flat, multiple injections may be given around the polyp or directly into the middle of the polyp. If a bleb does not form at the injection site when 1 ml of fluid has been given, the needle should be withdrawn since the tip may have penetrated the wall and pierced the serosal surface. When the needle is in the right plane, continuous injection of saline will result in a bleb, which is a fluid-filled collection of saline in the submucosa.

A large localized fluid collection is the desired endpoint, with marked elevation of the polyp. The absence of a visible bleb does not indicate that a bleb is forming on the serosal surface, since the only location of areolar tissue in which fluid can collect is the submucosa. Neither the mucosa, the polyp, or the muscular layer will expand with fluid injection. If the needle placement is too superficial, the fluid will leak out from the beveled edge of the needle and spill into the lumen.
The loss of injection solution into the lumen is especially noticeable when a colored fluid is used, such as methylene blue or a permanent surgical marker. Several repeated needle placements and attempts at injection might be required to locate the correct plane to result in polyp elevation. If possible, the approach by the needle injector should be tangential to the mucosal surface instead of perpendicular.

The desired elevation of the polyp may take 3-4 ml of saline given in one to four sites, although some authors use up to 30 ml of fluid [9]. Polyps up to 2 cm in diameter may be removed with one application of the snare, but larger polyps may require several transections in piecemeal fashion [10].