Injection sclerotherapy for peptic ulcer bleeding

PAUL RUTGEERTS, MD, PhD

P RUTGEERTS. Injection sclerotherapy for peptic ulcer bleeding. Can J Gastroenterol 1992;6(4):205-208. Injection therapy is easy to apply, simple and cheap. Pilot studies and controlled clinical trials have shown the efficacy for injection of adrenaline alone, adrenaline-polidocanol and absolute ethanol for hemostasis in peptic ulcer bleeding. Comparative trials with thermal therapies, (eg, laser, multipolar electrocoagulation and heater probe) have shown that injection therapy is equally effective. Increase in ulcer size and perforation probably do not occur more frequently than with thermal therapy. Injection therapy should be considered as one of the most promising techniques for peptic ulcer hemostasis.

Key Words: Hemorrhage, Injection therapy, Peptic ulcer

Sclérothérapie par injection de l'ulcère gastro-duodénal hémorragique.

RÉSUMÉ: Le traitement par injection est facile à administrer, il est simple et économique. Des études pilotes et des essais cliniques contrôlés ont démontré l'efficacité d'injections d'adrénaline seule, d'adrénaline-polidocanol et d'éthanol absolu pour l'obtention de l'hémostase dans des cas d'ulcères gastro-duodénaux hémorragiques. Des essais comparatifs portant sur des traitements thermiques, par exemple, laser, électrocoagulation multipolaire et sonde thermique, ont montré que le traitement par injection est d'une efficacité égale. L'aggravation de l'ulcère et la perforation ne surviennent probablement pas plus souvent qu'avec le traitement thermique. Le traitement par injection doit être envisagé comme l'une des techniques les plus prometteuses pour l'hémostase des ulcères gastro-duodénaux.

Department of Internal Medicine, Division of Gastroenterology, Leuven, Belgium

Correspondence and reprints: Dr Paul Rutgeerts, University Hospital Gasthuisberg,

Department of Internal Medicine, Division of Gastroenterology, Herestraat 49, 3000 Leuven, Belgium. Telephone 0/00/32/16/21.42.25, Fax 0/00/32/16/21.47.99

INJECTION SCLEROTHERAPY IS AN established method to treat acute variceal hemorrhage. As this method is simple, effective and quite safe, injection therapy also has been proposed as modality for treatment of acute non-variceal peptic ulcer bleeding.

In Europe and Canada, injection therapy with adrenaline-polidocanol has become very popular following the initial experience with the technique by Soehendra (1) and Kortan (2). Japanese endoscopists preferentially have been using absolute ethanol for injection and have built up a large experience in uncontrolled trials. Injection therapy has also been proposed as pretreatment modality before the application of Nd-YAG laser therapy (3,4). Injection with adrenaline 1:10,000 before laser therapy greatly increases the success rate of this therapy.

UNCONTROLLED TRIALS

Uncontrolled studies (5-13) have shown that endoscopic hemostasis may be accomplished by local injection at the bleeding site. Various solutions and combinations of agents have been used. About every source of bleeding has

TABLE 1
Injection therapy: Agents, volume and technique

Sclerosant	Volume/injection (mL)	Total volume (mL)	Injection site
Adrenaline 1:10,000	2	10 to 20	Ulcer rim + vessel
Polidocanol 1%	1	5 to 10	Vessel
Absolute ethanol	0.1	1 to 2	Vessel
100 international units thrombin	2 to 3	10 to 15	Vessel
Normal saline			
Ethanolamine oleate	0.5	2 to 5	Ulcer rim + vessel

been treated by this method, including benign and malignant tumours, vascular malformations, Mallory Weiss tears and ulcers, and therefore it is difficult to interpret much of the data. Newer studies have focused on the use of injection techniques for therapy of bleeding from visible vessels in peptic ulcers.

INJECTION TECHNIQUES AND SOLUTIONS USED

A disposable Teflon sclerotherapy catheter with a 23 gauge retractable needle that can be passed through the biopsy channel of a standard panendoscope was used. The volumes and injection sites depended on the solution used for injection (Table 1).

Adrenaline 1:10,000: Adrenaline 1:1,000 is diluted in 9 mL saline and injected submucosally in the rim of a small- or medium-sized ulcer with a central bleeding or nonbleeding vessel. The injection of 2 mL of this solution will immediately induce important swelling and whitening of the treated area. The injection is then repeated in the three other quadrants of the ulcer rim.

It is important to inject first the rim of the ulcer that is the farthest away from the scope to allow small ulcers to rise towards the scope. When the nearest border is injected first, swelling will impair vision of the ulcer and render further therapy more difficult. When the ulcer is large, submucosal injection of adrenaline 1:10,000 in the ulcer rim will not be efficacious (necessitating injection near or in the vessel) but the author feels that adrenaline is not the appropriate solution – a sclerosant is necessary. The total volume of adrenaline 1:10,000 injected is not

critical; usually 8 to 10 mL are injected, but up to 30 mL can be used safely.

Polidocanol 1%: Polidocanol 1% (Aethoxysclerol; Germany) seldom is used as the sole injection solution. Mostly it is used after pretreatment with adrenaline.

After submucosal adrenaline injection in the rim of the ulcer, polidocanol is injected near or in the vessel. Wördehoff (11), the only worker who uses polidocanol 1% as sole solution, injects up to 15 mL. Most other workers inject 3 to 5 mL directly at the vessel after adrenaline pretreatment. This treatment may be repeated, but in contrast to adrenaline 1:10,000, the important necrosis induced by polidocanol may predispose to perforation.

Absolute ethanol (98 to 99.5% pure dehydrated ethanol): For the injection of alcohol 98%, a 1 mL plastic disposable tuberculin syringe is used. Before introduction, the needle is filled with solution to allow careful quantitation of the injected volume. When a bleeding or nonbleeding vessel is exposed, 98% ethanol is injected slowly in amounts of 0.1 to 0.2 mL per injection at three or four sites close to or in the vessel. The volume injected usually does not exceed 1 mL because of the important necrosis induced by ethanol.

Ethanolamine oleate: Ethanolamine oleate is not frequently used for injection of bleeding peptic ulcers; 0.5 mL aliquots are injected around and directly in the vessel up to a total of 5 mL.

Thrombin: Pretreatment usually is carried out with adrenaline 1:10,000 injection. One hundred international units thrombin in 3 mL of 0.9% salt solution is used with 10 to 15 mL of solution.

EXPERIMENTAL STUDIES

Three experimental studies of injection therapy for bleeding peptic ulcer were carried out. Two studies (14,15) (in which the effect of injection was compared with thermal effects) showed that in the experimental ulcer model and in the mesenteric vessel model injection therapy was by far not as efficacious as thermal methods to control bleeding. These studies, however, have to be interpreted with caution. The experimental ulcer does not really mimic the bleeding peptic ulcer; it lacks the central vessel as it bleeds profusely from the edges and the exposed vessels surrounding submucosal tissue. It is clear that hemostasis by injection results from compression and sclerosis. Randall et al (16) found ethanol and a combination of 1% tetradecyl sulphate, 32% ethanol and 0.3 normal saline to be the most effective agents for arterial coagulation (polidocanol was somewhat less effective).

Necrosis induced by the injection of sclerosing agents is striking. Absolute ethanol and 1% polidocanol cause tissue necrosis with ulceration and vessel thrombosis. Absolute ethanol fixates the tissue, whereas polidocanol 1% causes acute edema with subsequent inflammation and sclerosis.

CONTROLLED TRIALS

Adrenaline: Chung et al (17), in a controlled trial, studied the efficacy of adrenaline injections for peptic ulcer hemostasis. Five of 34 patients underwent emergency operation in the injection group compared with 14 of 34 in the control group ($P < 0.02$).

Adrenaline-polidocanol: Panes et al (18) showed that injection with adrenaline-polidocanol was associated with significantly less severe rebleeding (5.5 versus 43%) and less surgery (5 versus 34%) than no treatment in patients with peptic ulcers with visible vessels with active bleeding, visible vessels without bleeding and ulcers with oozing hemorrhage or clot adherence to the ulcer base. A trial by Balanzo et al (19) showed benefit for adrenaline-polidocanol injection compared with medical therapy only as far as rebleeding and transfusion needs are concerned but the data are less impressive.

COMPARATIVE TRIALS

In a controlled randomized comparative trial, injection therapy with adrenaline followed by polidocanol is more effective in preventing rebleeding from ulcers with bleeding and nonbleeding visible vessels than injection of adrenaline alone, and is at least as effective as injection of adrenaline followed by YAG laser therapy (20). In a subsequent trial, injection of absolute ethanol was found comparable with injection of adrenaline-polidocanol for prevention of rebleeding from ulcers with nonbleeding visible vessels (21).

In a prospective randomized trial involving 64 patients with bleeding ulcers, Balanzo et al (22) compared injection therapy using adrenaline with injection of adrenaline plus thrombin. The addition of thrombin to adrenaline did not improve the results of therapy.

Laine (23) compared injection therapy (with absolute ethanol) with multipolar electrocoagulation and found both methods to be equally effective and safe for controlling active bleeding from peptic ulcers or to

prevent rebleeding from ulcers with nonbleeding visible vessels.

Chung et al (24) compared the efficacy of endoscopic adrenaline injection with heater probe in actively bleeding peptic ulcers in a prospective randomized trial. Bleeding was initially better controlled with adrenaline injection than with heater probe (96 versus 83%, $P < 0.05$), but outcome was further comparable in both groups. In the heater probe group there were two perforations.

In a randomized controlled trial comparing absolute alcohol injection with heater probe for the treatment of bleeding and nonbleeding vessels from peptic ulcers, Lin et al (25) found the heater probe to be more effective than injection. In this trial, emergency surgery rates and mortality were lowered by both techniques compared with controls.

COMPLICATIONS

Experimental studies have shown that most of the sclerosants used may cause important stomach wall injury

(14,15). Clinical experience has also shown that injection therapy is associated with about the same complication rate as thermal therapy (26). Induction of active bleeding occurs seldom and is mostly the consequence of touching the visible vessel when the needle is advanced through the biopsy channel (personal communication). Perforations have been described with injection of absolute ethanol, polidocanol and ethanolamine oleate (5,27).

CONCLUSIONS

The National Institutes of Health Consensus Development Conference identified multipolar electrocoagulation and heater probe as the most promising modalities for endoscopic hemostatic therapy. The present data show that injection therapy should certainly be added to the list (further studies are necessary to improve techniques). A key question is whether injection therapy can be combined with the promising thermal modalities in order to increase efficacy.

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