Injection Sclerotherapy
Rubber Band Ligation

R Sim
TTS Hospital
Pathophysiology of hemorrhoids (mechanical theory)

1. Mobilization of plexus
2. Stretching of support system
3. Hemorrhoidal tissue prolapsing on straining
4. Park’s ligaments in situ

1. Rupture of anchoring system
2. Permanently prolapsed hemorrhoidal tissue
3. Stretching or rupture of Park’s ligament
4. Lateralization of external hemorrhoidal plexus
Normal situation
- arteriovenous shunts closed
- precapillary sphincters opened

Abnormal situation
- opening of arteriovenous shunt
- contraction of precapillary sphincters

1 arteriola
2 venula
3 arteriovenous shunt
5 capillary

Pathophysiology of internal hemorrhoids
(vascular theory)
Hemorrhoids can be graded following physical examination.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Symptoms</th>
<th>Signs</th>
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<tbody>
<tr>
<td>I</td>
<td>Bleeding, discomfort</td>
<td>Hemorrhoids visible only by proctoscopy, swelling on straining, not prolapsed</td>
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<tr>
<td>II</td>
<td>Varying degrees of discharge/pruritus</td>
<td>Hemorrhoids prolapsing at margin on straining but withdrawing spontaneously as soon as straining stops</td>
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<tr>
<td>III</td>
<td>Weeping discharge, frank prolapse</td>
<td>Prolapse during defecation or during straining and requiring manual reinsertion</td>
</tr>
<tr>
<td>IV</td>
<td>Pain</td>
<td>Irreducible prolapse or recurring immediately after manual reduction</td>
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</table>
There is little difference in efficacy on bleeding between ligation and sclerosis or infrared coagulation. Ligation remains the most effective method for control of a prolapse. In grade II cases, ligatures are used if hemorrhoids are extremely mobile. In grade III cases, ligatures are preferred in the elderly with a less tonic sphincter and surgery in younger individuals. In all cases, instrumental methods can be used with the application to each individual case of the most appropriate method, and in the final analysis less than 5% to 10% of hemorrhoids require excision surgery.

<table>
<thead>
<tr>
<th>Hemorrhoid grade</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>I</td>
<td>Sclerosing injections, photocoagulation, bicap</td>
</tr>
<tr>
<td>II</td>
<td>Elastic ligation or bicap</td>
</tr>
<tr>
<td>III</td>
<td>Elastic ligation, surgery</td>
</tr>
<tr>
<td>IV</td>
<td>Surgery</td>
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Sclerotherapy

- Principles
A sclerous scar is obtained by inducing an inflammatory reaction with various substances: quinine hydrochloride - urea, 5% phenol, 1 or 2% polidocanol, hypertonic sodium chloride.

- Equipment
A 10-mL syringe, an ampoule of substance, a small-caliber (28G, for example) needle, an extension, a proctoscope.

- Procedure
The injection is strictly submucosal via the proctoscope and at the summit of each hemorrhoid group. Hemorrhoids are identified during withdrawal of the apparatus which is then reinserted for a few millimeters.
The injection is performed immediately adjacent to the anorectal junction. It must be painless. The patient sometimes feels a slight hot sensation at the end of the injection. About 2 to 5 mL of sclerosing substance are injected. The needle is left in place for about 10 seconds in order to avoid reflux of the substance in the anal canal. The entire hemorrhoidal ring is sclerosed at one session. Repeated injections during multiple sessions are no longer justified.

- Errors to be avoided
  - An excessively superficial injection leads to immediate formation of a submucosal bubble or to whitening of the mucosa. The injection must be stopped immediately because of the risk of necrosis and bleeding.
  - An injection too deep in muscle is painful. The injection must be stopped if the patient complains of pain.
  - In some instances, sclerosing injections are complicated by hematuria, hematospermia, prostatitis or submucosal abscesses. These complications are extremely rare. They can be prevented by avoiding injection at the midline.
- Injection of too large an amount of substance may lead to the formation of necrosis.

- Complications and how to deal with them
  - Signs of intolerance (faintness, headache, vertigo) can be avoided if the patient is previously relaxed and well informed. If they should nevertheless occur, the injection must be stopped. A subcutaneous injection of atropine may be useful in some rare cases.
  - Discomfort is possible during the following hours in 30% of patients. Frank pain is rare. Analgesics may sometimes be necessary.
  - Bleeding is possible.
<table>
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<tr>
<th>Latency</th>
<th>Cause</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 24 h</td>
<td>Local damage to submucosal vessel</td>
<td>(optional): application of 1/1000 adrenaline solution</td>
</tr>
<tr>
<td>2 - 4 days</td>
<td>Persistence of bleeding hemorrhoids</td>
<td>Await for procedure to become effective</td>
</tr>
<tr>
<td>5 - 10 days</td>
<td>Detachment of necrosis</td>
<td>Generally do nothing. Rarely: surgical hemostasis</td>
</tr>
</tbody>
</table>

- Resistance to injection may be due to: previous sclerosing treatment, needing a change in injection site, or an injection which has been administered too deeply. In all cases, what needs to be done is to slightly withdraw the needle.
- An external thrombosed hemorrhoid may complicate sclerosis during the first 48 hours. Prescription for a short time of nonsteroidal anti-inflammatory drugs is usually sufficient.
Rubber band ligation

- Principle
This procedure involves placing a rubber band at the base of the hemorrhoidal tissue. Tissue necrosis occurs in a few days, partially trapping vessels supplying the hemorrhoid, reducing the size of the cushion and above all causing fibrosis which will attach the plexus.

- Equipment
A ligator and a proctoscope.

- Technique
The apparatus is positioned at the summit of a hemorrhoid clump. The muscularis is pulled into a cylinder either by aspiration or traction (toothed ligator). A mobile ring is used to slide an elastic band from around the cylinder onto the base of the mucosa which has been drawn and pediculized into the ligator cylinder. The mucosa is "strangulated" and deprived with blood supply and will gradually necrose.
- Management following elastic band ligation

A number of precautions must be prescribed after the procedure.

- If severe pain should develop during the first 48 hours or if a secondary thrombosed hemorrhoid develops, a nonsteroidal anti-inflammatory drug may be useful. Metronidazole is prescribed routinely in diabetic, seropositive or immunodepressed (corticosteroids) patients.

- Errors to be avoided

The ligature must be applied fairly low in order to be effective but not too much in order to avoid being painful. Should the contrary apply, pain may be severe at the outset or later because the ligature has reached the anal canal zone sensitive to pain.
- Complications and ways of dealing with them

- Immediate dropping off of the rubber band
  The tissue mass is too small to hold the elastic band or too large leading to excessive tension applied to the elastic which then breaks. Early defecation may also lead cause a ligature to fall off.

- Pain
  - Immediate: the rubber band must be removed immediately by dividing it by using a hand scalpel.
  - During subsequent days, moderate pain is frequent. Patients must be informed of this. In almost 10% of cases, it may be sufficiently severe to require an analgesic to be taken. It is sometimes extremely severe making impossible for the patient to return to work. Nonsteroidal anti-inflammatory drugs are effective if there is no contraindication, but they have been accused of predisposing to severe secondary infections. Combined prescription of metronidazole is sometimes advised.
- Late: the possibility of an extensive infection must be borne in mind. This is a rarity and is favored by an immunodepressed state. The first signs of infection are above all dysuria, then pain and fever.

- Bleeding
Bleeding occurs in 2% to 6% of cases. Patients must be informed of this possibility. In certain instances, bleeding may require hospital monitoring or even surgical hemostasis. Patients should take special note if bleeding occurs in the absence of rectal evacuation. This implies the need to provide the patient with means of reaching a competent center within a short time, during the 2 weeks following ligation, and this procedure must not be performed if distant travel has been arranged.
• Ligature prolapse
If the hemorrhoid is very mobile, the ligature may prolapse during the first defecation. It is essential for the patient to return it into the anal canal using a greasy topical, in order to avoid extensive thrombosis. Such prolapse in no way brings into question the efficacy of the procedure.

• An external thrombosed hemorrhoid
Possible complication of any instrumental procedure, this is treated by short prescription of an anti-inflammatory agent. Thrombosed prolapse is an exceptional possibility.

- Number of sessions
It is inadvisable to perform more than two ligatures per session, since this increases the risk of pain.