A prospective study of infrared coagulation, injection and rubber band ligation in the treatment of haemorrhoids

A.J. Walker 1, R.J. Leicester 1, R.J. Nicholls 2 and C.V. Mann 2

1 Royal Naval Hospital Haslar, Gosport and 2 St. Mark's Hospital London, UK
Accepted: 24 January 1990

Abstract. One hundred patients with non-prolapsing and one hundred with prolapsing haemorrhoids were allocated to receive conventional treatment (CT) by injection sclerotherapy or rubber band ligation, or infrared photocoagulation (IRC). Significantly more patients with non-prolapsing haemorrhoids were symptom free after IRC (81%) than CT (59%) at three months, (\( \chi^2 = 4.4, p = 0.05 \)). There was no significant difference in the outcome at 1 or 4 years. Likewise for prolapsing haemorrhoids, there was no significant difference in the outcome of IRC or CT at 3 months, one or 4 years. However, recurrence of prolapse was more common after IRC (54%) than rubber band ligation (RBL) (27%) at 1 year (\( \chi^2 = 3.46, p < 0.1 \)). IRC was significantly less painful than CT (\( p < 0.001 \)). IRC is a safe, rapid, non-invasive alternative to CT, which is acceptable to the patient and gives similar results, though RBL provides more rapid and longer lasting relief from prolapse.

Introduction

Out-patient treatment of haemorrhoids can significantly reduce the cost of treatment of this common condition. Many alternative methods are being used with an accompanying reduction in the operation rate.

Injection sclerotherapy has been the mainstay of out-patient treatment for more than a century and deals adequately with most non-prolapsing, and some of the smaller prolapsing, haemorrhoids. Rubber band ligation has become more widely used for the treatment of prolapsing haemorrhoids and would seem to be as effective as haemorrhoidectomy in most cases of second degree haemorrhoids [1, 2]. A new technique, using infrared coagulation, was described in 1977 [3]. This prospective study was performed to evaluate the technique and compare it with injection sclerotherapy and rubber band ligation, both immediately after treatment and at 1 and 4 years later.

Patients and methods

Patients

One hundred consecutive patients with non-prolapsing haemorrhoids (Group I – 68 male, 32 female, mean age 38 years) and 100 with prolapsing haemorrhoids (Group II – 64 male, 36 female, mean age 49 years), suitable for out-patient treatment, attending specialist rectal clinics at three hospitals were entered into the study. Prolapse was defined according to whether or not the haemorrhoids were visible through a proctoscope placed at the anal margin when the patient was asked to strain. Patients were then randomized to receive either conventional treatment (CT-injection or rubber band ligation) or infrared coagulation (IRC). All patients were advised to increase the amount of fibre in their diet to avoid straining at stool. Assessments were made at intervals of 6 weeks by an independent observer and further treatment carried out as necessary. Further assessment was made, at interview, 3 months after completion of treatment and by questionnaire 1 and 4 years after treatment.

Treatment

For conventional treatment a decision was made on the suitability of the haemorrhoids for injection or rubber band ligation, depending on the size of the haemorrhoidal mass and the laxity of the mucosa, the larger haemorrhoids being allocated to rubber band ligation. Injection sclerotherapy was performed using 5% phenol in arachis oil in the standard manner [4]. Rubber band ligation was performed using a technique similar to that described by Groves et al. [6]; not more than two haemorrhoids were banded at any one attendance. Infrared photocoagulation was performed using a one second pulse at the base of each haemorrhoid, at a level one would normally select for injection. At least two points were coagulated per haemorrhoid, with as many as six if the haemorrhoid was particularly large [7].

Results

Group I: Non-prolapsing haemorrhoids

After two treatment sessions, 79 patients attended for assessment. Significantly more patients were symptom-free after infrared coagulation than following injection. Three months later, the same 79 patients were reassessed...
with no change in the results (IRC 81%/injection 59%; 
$\chi^2 = 4.4$, $p = 0.05$) (Table 1). There was no difference in the 
number of treatment sessions required to achieve 
symptomatic relief (IRC 2 ± 0.8/injection 2 ± 0.7).

One year after completion of treatment, 73 patients 
returned a completed questionnaire; 36 had suffered fur-
ther symptoms but 32 (89%) of these agreed that their 
symptoms were less severe than prior to treatment and only 7 (10%) had sought further medical treatment. There was no significant difference between the treatment methods used (Table 2).

Four years after completion of treatment, 43 patients 
returned another completed questionnaire. Twenty-nine 
(67%) had suffered further symptoms, 14 (33%) of whom 
had sought medical treatment. No patient required oper-
ative treatment in either group, although 2 in each group 
underwent further injection sclerotherapy and 1, previously 
photocoagulated, was treated by rubber band lig-
ation. The remainder were given suppositories (Table 2).

**Group II: Prolapsing haemorrhoids**

In this group, of those receiving conventional treatment, 
10 (20%) underwent injection and 40 (80%) rubber band 
ligation. Eighty-six patients were assessed after two treat-
ments, more patients being symptom-free after infrared 
coagulation, but this was not statistically significant.

Three months later the same 86 patients attended for 
review. Again there was no significant difference in the 
results of the treatment methods, 65 (76%) of the patients 
remaining free of symptoms (Table 3). Slightly more 
treatment sessions were required for infrared coagulation 
(2.7 ± 0.8) than for conventional treatment (2.4 ± 0.8), 
but the difference was not statistically significant.

| Table 1. Group I–non prolapsing, 3 months (n = 79) |
|-----------------|-----------------|
|                | IRC             | Injection       |
| Symptom free   | 34 (81%)        | 22 (59%)$^a$    |
| Improved       | 7 (17%)         | 11 (30%)        |
| No change      | 1 (2%)          | 4 (11%)         |
|                | 42              | 37              |

$^a$ $\chi^2 = 4.4$; $p = 0.05$

| Table 2. One year (n = 73) and 4 years (n = 43) |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | IRC             | Injection       | IRC             | Injection       |
|                | 1 year          | 4 years         | 1 year          | 4 years         |
| Symptom free   | 20 (53%)        | 5 (25%)         | 17 (49%)        | 9 (39%)         |
| Recurrent symptoms | 18 (47%)       | 15 (75%)        | 18 (51%)        | 14 (61%)        |
| Further treatment: |               |                |                |                |
| Nil            | 16 (88%)        | 10 (67%)        | 13 (72%)        | 5 (36%)         |
| GP treatment   | 1 (6%)          | 1 (7%)          | 3 (17%)         | 6 (43%)         |
| Hospital treatment | 1 (6%)        | 4 (26%)         | 2 (11%)         | 3 (21%)         |
|                | 38              | 20              | 35              | 23              |

Eighty-five patients returned completed question-
naires one year after treatment (Table 4). Fifty-four 
(64%) had recurrent symptoms but only 16 (19%) had 
sought further treatment. Of those with symptoms, 52 
admitted that their symptoms were less than prior to 
initial treatment. There was no significant difference in 
the recurrence rate between the treatment methods. How-
ever, when types of symptom were analyzed separately, 
recurrence of prolapse was more common after infrared 
coagulation (54%) compared with rubber band ligation 
(27%), ($\chi^2 = 3.46$, $p < 0.1$). Three who had infrared co-
agulation subsequently underwent haemorrhoidectomy. 
Of the 9 patients in the IRC group who underwent hospi-
tal treatment, 6 had rubber band ligation for persistent 
prolapse, 1 further infrared coagulation, 1 a haemor-
rhoidectomy, and 1 injection sclerotherapy.

Four years after completion of treatment, 73 patients 
returned completed questionnaires (Table 4). There was 
no significant increase in those with recurrent symptoms 
(63%) compared with those at 1 year. There was no in-
crease in those seeking GP or hospital treatment, but one 
进一步 patient had undergone haemorrhoidectomy.

**Side effects**

Six weeks after their first treatment, all patients were 
asked whether they had suffered any side effects 
(Table 5). The most common after effect of infrared coag-
ulation was bleeding, occurring typically at 7–10 days 
after treatment, but in no case was this severe. In con-
trast, pain, usually described as a dull aching sensation 
commencing 1–2 hours after treatment and lasting for up 
to 48 h, occurred in 70% of cases undergoing injection 
and 60% after rubber band ligation, compared with 8% 
of patients after infrared coagulation ($\chi^2 = 71.3$, 
$p = 0.001$). Despite the side effects, when questioned 1 
year later, over 90% of patients stated that they would be 
prepared to undergo the same treatment again, with no 
significant difference between the treatment groups.

**Discussion**

Economic problems in the western world and the length-
ening waiting lists for hospital admission have led to an