

# An Unusual Complication of Rubber Band Ligation of Hemorrhoids

DEBRA G. WECHTER, M.D., GREGORY K. LUNA, M.D.\*

Wechter DG, Luna GK. An unusual complication of rubber band ligation of hemorrhoids. *Dis Colon Rectum* 1987;30:137-140.

Rubber band ligation of hemorrhoids has had a low incidence of complications until recently, when five deaths resulted from bacterial septicemia or toxemia. The case presented describes a severe soft-tissue infection following banding successfully treated with antibiotics, surgical debridement, and hyperbaric oxygen. [Key words: Hemorrhoids; Rubber band ligation; Clostridial infection; Soft-tissue infection]

THE MANAGEMENT OF hemorrhoids includes various modalities, such as cryotherapy,<sup>1-3</sup> sclerotherapy,<sup>4-7</sup> anal dilatation,<sup>8-9</sup> hemorrhoidectomy,<sup>10-14</sup> and rubber band ligation. The last of these methods is quite popular because it is able to be performed as an office procedure and has a low incidence of complications.

Recently, five fatalities have resulted from soft-tissue infection following rubber band ligation.<sup>15,16</sup> The case reported here describes a life-threatening soft-tissue infection following hemorrhoidal banding. Unusual aspects of this case are the inability to identify a causative organism and the development of myoglobinuria without evidence of myonecrosis. The patient survived this severe complication with multimodality treatment including surgical exploration, antibiotics, and hyperbaric oxygen.

## Report of a Case

A healthy 42-year-old woman underwent outpatient rubber band ligation of a right posterior hemorrhoid. Two days after banding, she

*From the Department of Surgery, Seattle Veterans Administration Medical Center and the Department of Surgery, Harborview Medical Center,\* University of Washington, Seattle, Washington*

noted increasing pain, difficulty in urinating, anorexia, dizziness, perineal swelling, suprapubic pain, and pain radiating down her legs.

She was hospitalized on the fifth postoperative day, afebrile with a nontender abdomen and a WBC of 16.9 thousand/uL. Proctosigmoidoscopy showed necrosis at the banding site with underlying fullness and no external swelling. Cefopyrazone was begun. Later that evening she complained of pain in the right buttock, medial thigh, and bladder area. She was hypotensive but responded to intravenous fluids.

The next day she was nauseated, afebrile, and had a distended abdomen with right lower quadrant tenderness. Her WBC was 28.7 thousand/uL. Hypaque® enema showed no extravasation. Abdominal ultrasound demonstrated extensive retroperitoneal edema. Antibiotics were changed to gentamicin, clindamycin, and penicillin. Because of progression of the disease and the possibility of a necrotizing soft-tissue infection, she was transferred to the Harborview Medical Center. On admission, examination revealed lower abdominal tenderness with edema and boggy of the buttocks, right greater than left. She had a WBC of 28.0 thousand/uL and microscopic hematuria. Chest x-ray was normal.

She was taken immediately to the operating room where exploratory laparotomy, bilateral retroperitoneal, right perirectal, and retrorectal exploration revealed bilateral retroperitoneal and right perirectal edema without necrotic tissue except at the site of hemorrhoidal banding. Multiple culture specimens were taken. Aspiration of the right perirectal area showed 2-3+ WBCs and 1+ gram positive rods on Gram's stain without further growth. Tissue taken from the right perirectal space had no cells or organisms on Gram's stain, but grew *Bacteroides fragilis* from the broth only. Gram's stain of the retrorectal space tissue showed 1+ WBCs and no organisms, but grew one colony of lactose-fermenting gram negative rods and 2+ *Bacteroides fragilis*. Samples of peritoneal fluid, retroperitoneal fluid, and blood grew no organisms.

After surgery, she remained afebrile and had high fluid requirements. The following day, she was returned to the operating room where all wounds were re-examined without evidence of new tissue necrosis. Postoperatively she developed hypoxemia, myoglobinuria,

Received for publication August 14, 1986.

Address reprint requests to Dr. Wechter: Department of Surgery, Seattle VA Medical Center, 1660 South Columbian Way, Seattle, Washington 98108.

TABLE 1. Complications of Rubber Band Ligation of Hemorrhoids in 39 Studies of 8,060 Patients<sup>27-65</sup>

	Patients Affected		
	Number of Patients	Percentage of All Patients	Percentage Range of Studies
Pain	464	5.8	0-70.6
Recurrence or failure	223	2.8	0-28.4
Hemorrhage	135	1.7	0-20
Skin tag	79	1.0	0-33.3
Incontinence	70	0.9	0-6.9
Thrombosis	51	0.6	0-4
Perianal hematoma	43	0.5	0-6.5
Fissure or fistula	29	0.4	0-20
Band removal	21	0.3	0-3.3
Stenosis	5	0.06	0-26.7
Prolapse	5	0.06	0-5
Infection	4	0.05	0-2.9
Pruritus	3	0.04	0-4
Edema	3	0.04	0-3
Urinary retention	3	0.04	0-2.6
Sphincter spasm	3	0.04	0-0.3
Hypertrophied or thrombosed papilla	3	0.04	0-0.2
Anal canal hematoma	2	0.02	0-1.9
Fecal impaction	2	0.02	0-0.7
Allergy	1	0.01	0-0.4
Death (due to acute lymphocytic leukemia)	1	0.01	0-0.1

and coagulation deficits without laboratory evidence of hemolysis. Concern for development of myonecrosis led to her return to the operating room the next day for exploration of all wounds, exploratory laparotomy, and sigmoidoscopy. Again, tissue necrosis was absent except for that previously noted at the site of hemorrhoidal banding. Because of massive edema and lack of a source of myoglobinuria, lower extremity compartment pressures were measured and found to be normal. Later that day, she began a series of seven hyperbaric oxygen treatments. Antibiotics were changed to cefotaxime, penicillin, and metronidazole. Because of the picture of an ongoing inflammatory insult without evidence of persistent infection, methylprednisolone was added. Although she improved initially with the addition of hyperbaric oxygen and steroids, her toxic course continued.

Four days after the previous operation, she was returned to the operating room for examination of all wounds. Again, the only necrotic tissue was at the site of banding. This was excised and a transverse loop colostomy was created. Following this final procedure, the patient became stable and was extubated four days postoperatively. Antibiotics were stopped a day later and she was transferred to the ward, where she continued to improve. The only complications were difficulty in voiding and bilateral serous oitis media, thought to be a result of barotrauma. She was transferred to the referring hospital 23 days after hemorrhoidal banding.

### Discussion

Several methods of treating hemorrhoids are employed today, with few complications. Those that occur are often minor, such as pain, hemorrhage, urinary retention, thrombosis, infection, fecal impaction, anal fissure, and incontinence. Late complications include anal stenosis, skin tags, recurrence of hemorrhoids, and prolapse.

A small number of more serious complications following these procedures have been reported in the literature. Cryotherapy has resulted in a case of fatal meningitis<sup>17</sup> as well as two cases of granulomatous ulcer.<sup>18</sup> One major complication of sclerotherapy has been described in which submucosal injection led to necrosis, rectal perforation, and ultimately retroperitoneal abscess.<sup>19</sup> Hemorrhoidectomy has resulted in septic pulmonary embolus with empyema<sup>20</sup> and also tetany secondary to hyperventilation.<sup>21</sup> Larvae of *Cochliomyia hominivorax* caused multiple colonic perforations in a patient who had undergone hemorrhoidectomy.<sup>22</sup> It is interesting to speculate why more infectious complications do not occur, since bacteremia occurs in 8.3 percent, 2 percent, and 8 percent of patients during hemorrhoidectomy,<sup>23</sup> proctoscopy,<sup>24</sup> and sclerotherapy<sup>24</sup> respectively.

Since its introduction by Blaisdell in 1958<sup>25,26</sup> and modification by Barron in 1963,<sup>27</sup> ligation of hemorrhoids generally has been associated with infrequent minor complications (Table 1).<sup>27-65</sup>

Two major infectious complications have occurred. A case of tetanus followed rubber band ligation of internal hemorrhoids,<sup>66</sup> and liver abscess resulted from silk ligation of hemorrhoids.<sup>67</sup>

Recently, however, several fatalities have been reported. The first of these was a case of Clostridial sepsis following banding of three hemorrhoids.<sup>15</sup> In 1985, Russell and Donohue<sup>16</sup> described four patients who died of bacterial sepsis or toxemia after rubber band ligation of hemorrhoids.

Symptoms of each patient noted in these case reports included difficulty in urinating and severe pain. These clues were also present in the present patient. All patients had fever and a demonstrable infection except for the present patient and one of those presented by Russell and Donohue.

The present patient's clinical picture of sepsis without fever, but with leukocytosis, hypoxemia, coagulopathy, and high fluid requirements, was puzzling. Clinical impression was of an anaerobic Clostridial infection, since gram positive rods were found on Gram's stain of the right perirectal area aspirate at the first operation. Although tissues from the retrorectal space grew *Bacteroides fragilis* and a lactose-fermenting gram negative rod, and right perirectal space tissue grew *Bacteroides fragilis*, no organisms were seen on Gram's stain, and these were not thought to be significant in the etiology of her infection. The inability to discover a clearly causative organism may have been due to the early institution of antibiotics or improper anaerobic culture techniques.

Another unsolved mystery was the development of myoglobinuria. No area of myonecrosis was found, despite numerous explorations and testing for lower extremity compartment syndrome. The area of necrosis at the

site of banding did not seem large enough to account for significant myoglobinuria.

Treatment of this patient included aggressive and repeated surgical exploration, early institution of antibiotics, and hyperbaric oxygen. The mechanism of action of hyperbaric oxygen is not fully elucidated. By improving oxygenation of infected and adjacent tissues, the oxidation-reduction potential is increased, thereby decreasing bacterial multiplication.<sup>68</sup> Also toxin production, especially alpha-toxin, is inhibited, thus halting further tissue destruction.<sup>69</sup> The presence of exotoxin should be suspected in patients without an inflammatory response in the wound.<sup>70</sup> This patient had evidence of inflammation with white blood cells on Gram's stain of the perirectal aspirate, and also had no measurable serum alpha-toxin. She appeared to respond favorably, however, to hyperbaric oxygen as adjunctive therapy. Although no controlled clinical trials have been performed, the survival rate of patients with Clostridial infection seems to be improved with the addition of hyperbaric oxygen.<sup>71</sup> Controlled animal studies definitely have shown the benefits of hyperbaric oxygen when utilized with surgical debridement and antibiotics.<sup>72, 73</sup>

### Conclusion

Hemorrhoidal banding has resulted in five fatalities in recent years, as well as this case of severe soft-tissue infection with a successful outcome. It is clear that certain symptoms, such as severe pain and difficulty in urinating, have been present in every case and should serve as a warning. Certainly careful follow-up and patient education after ligation help lead to early diagnosis. Once a soft-tissue infection is noted, antibiotics, along with surgical exploration and debridement, should be instituted rapidly. Hyperbaric oxygen may be used as adjunctive therapy. Early, aggressive, and comprehensive treatment may help to achieve a successful outcome in these patients.

*Editor's Note: The September 1986 issue of DC&R (not yet available to the authors when this paper was prepared) contains an article dealing with a somewhat similar complication of rubber band ligation that was treated successfully with antibiotics only.—J.R.H.*

### References

- Lewis MI, de la Cruz T, Gazzaniga DA, Ball TL. Cryosurgical hemorrhoidectomy: preliminary report. *Dis Colon Rectum* 1969;12:371-8.
- Oh C. One thousand cryohemorrhoidectomies: an overview. *Dis Colon Rectum* 1981;24:613-7.
- Traynor OJ, Carter AE. Cryotherapy for advanced haemorrhoids: a prospective evaluation with 2-year follow-up. *Br J Surg* 1984;71:287-9.
- Terrell RV. Injection treatment of internal hemorrhoids. *South Med J* 1962;55:701-3.
- Laurisin E. Sclerotherapy of hemorrhoids. *Am J Proctol* 1971;22:241-2.
- Ahmad M. Injection treatment of piles. *JPMA* 1984;34:318-9.
- Ambrose NS, Morris D, Alexander-Williams J, Keighley MR. A randomized trial of photocoagulation or injection sclerotherapy for the treatment of first- and second-degree hemorrhoids. *Dis Colon Rectum* 1985;28:238-40.
- Lord PH. A new regime for the treatment of haemorrhoids. *Proc R Soc Med* 1968;61:935-6.
- O'Connor JJ. Manual anal dilatation (Lord hemorrhoidectomy). *Am J Proctol* 1976;27:32.
- Söderlund S. Results of haemorrhoidectomy according to Milligan: a follow-up study of 100 patients. *Acta Chir Scand* 1962;124:444-53.
- Ganchrow MI, Mazier WP, Friend WG, Ferguson JA. Hemorrhoidectomy revisited—a computer analysis of 2,038 cases. *Dis Colon Rectum* 1971;14:128-33.
- Nieves PM, Perez J, Suárez JA. Hemorrhoidectomy—how I do it: experience with the St. Mark's Hospital technique for emergency hemorrhoidectomy. *Dis Colon Rectum* 1977;20:197-201.
- Muldoon JP. The completely closed hemorrhoidectomy: a reliable and trusted friend for 25 years. *Dis Colon Rectum* 1981;24:211-4.
- McConnell JC, Khubchandani IT. Long-term follow-up of closed hemorrhoidectomy. *Dis Colon Rectum* 1983;26:797-9.
- O'Hara VS. Fatal clostridial infection following hemorrhoidal banding. *Dis Colon Rectum* 1980;23:570-1.
- Russell TR, Donohue JH. Hemorrhoidal banding: a warning. *Dis Colon Rectum* 1985;28:291-3.
- Anderson J, Steger A. Fatal meningitis complicating cryosurgery for haemorrhoids. *Br Med J [Clin Res]* 1984;288:826.
- Walls A. Granulomatous rectal ulcer following cryotherapy to haemorrhoids. *J R Coll Surg Edinb* 1978;23:315-6.
- Ribbans WJ, Radcliffe AG. Retroperitoneal abscess following sclerotherapy for hemorrhoids. *Dis Colon Rectum* 1985;28:188-9.
- Liffmann KE, Houle DB. Septic pulmonary embolus with empyema following hemorrhoidectomy. *Am J Proctol* 1964;15:55-8.
- Higgins PM. Tetany as a complication of hemorrhoidectomy. *Dis Colon Rectum* 1964;7:321-3.
- Grinberg EG, Urli RA, Pezoimburu A. Rare myiasis complication caused by *Cochliomyia hominivorax* in a case of hemorrhoidectomy [Span]. *Prensa Med Argent* 1969;56:733-6.
- Bonardi RA, Rosin JD, Stonesifer GL Jr, Bauer FW. Bacteremias associated with routine hemorrhoidectomies. *Dis Colon Rectum* 1976;19:233-6.
- Adami B, Eckardt VF, Bitter Suermann R, Karbach U, Ewe K. Bacteremia after proctoscopy and hemorrhoidal injection sclerotherapy. *Dis Colon Rectum* 1981;24:373-4.
- Blaisdell PC. Prevention of massive hemorrhage secondary to hemorrhoidectomy. *Surg Gynecol Obstet* 1958;106:485-8.
- Blaisdell PC. Office ligation of internal hemorrhoids. *Am J Surg* 1958;96:401-4.
- Barron J. Office ligation treatment of hemorrhoids. *Dis Colon Rectum* 1963;6:109-13.
- Barron J. Office ligation of internal hemorrhoids. *Am J Surg* 1963;105:563-70.
- Barron J, Fallis LS. Non-operative treatment of internal hemorrhoids. *Can Med Assoc J* 1964;90:910-4.
- Carden AB. Out-patient rubber-band ligation of internal haemorrhoids. *Med J Aust* 1965;2:1059-61.
- Blaisdell PC. Office ligation of internal hemorrhoids: a 10 year report, with simplified technic. *Am J Proctol* 1966;17:125-32.
- Salvati EP. Evaluation of ligation of hemorrhoids as an office procedure. *Dis Colon Rectum* 1967;10:53-6.
- Clark CG, Giles GR, Goligher JC. Results of conservative management of internal haemorrhoids. *Br Med J [Clin Res]* 1967;2:12-4.
- Boggs HW Jr, Slagle GW. Ligation of internal hemorrhoids by the Barron band technic. *South Med J* 1967;60:1009-10.
- Frink NW, Duckler L. Nonoperative ligation treatment of internal hemorrhoids. *JAMA* 1968;204:375-6.
- Bourland HS, Smith WD. Internal hemorrhoidectomy as an office

- procedure. *Am Surg* 1968;34:367-70.
37. Muir D. Ligation treatment of haemorrhoids in the surgery: an appraisal. *Med J Aust* 1969;1:213-6.
  38. Eastman PF, Applebaum IA. Critical evaluation of internal hemorrhoidal ligation as an outpatient procedure. *Am J Proctol* 1969;20:109-14.
  39. Carden AB. Rubber ring ligation of internal haemorrhoids. *Proc R Soc Med* 1970;63(suppl):112-4.
  40. Dick ET. The rooms treatment of internal haemorrhoids by ring-ing. *NZ Med J* 1970;71:83-5.
  41. Salvati EP. Ligation of internal haemorrhoids. *Proc R Soc Med* 1970;63(suppl):111-2.
  42. Hood TR, Alexander Williams J. Anal dilatation versus rubber band ligation for internal hemorrhoids: method of treatment in outpatients. *Am J Surg* 1971;122:545-8.
  43. Groves AR, Evans JC, Alexander Williams J. Management of internal haemorrhoids by rubber-band ligation. *Br J Surg* 1971; 58:923-4.
  44. Bandi KL. A new technique for nonoperative removal of haemorrhoids. *J Indian Med Assoc* 1972;59:77-8.
  45. Rudd WW. Ligation of hemorrhoids as an office procedure. *Can Med Assoc J* 1973;108:56-9.
  46. Dencker H, Hjorth N, Norryd C, Tranberg K-G. Comparison of results obtained with different methods of treatment of internal haemorrhoids. *Acta Chir Scand* 1973;139:742-5.
  47. Jones CB, Schofield PF. A comparative study of the methods of treatment for haemorrhoids. *Proc R Soc Med* 1974;67:51-3.
  48. Panda AP, Laughton JM, Elder JB, Gillespie IE. Treatment of haemorrhoids by rubber band ligation. *Digestion* 1975;12:85-91.
  49. Bartizal J, Slosberg PA. An alternative to hemorrhoidectomy. *Arch Surg* 1977;112:534-6.
  50. Arabi Y, Gatehouse D, Alexander-Williams J, Keighley MR. Rubber band ligation or lateral subcutaneous sphincterotomy for treatment of haemorrhoids. *Br J Surg* 1977;64:737-40.
  51. Moller C, Kiviluoto O, Santavirta S. Rubber band ligation of haemorrhoids: analysis of 281 patients. *Ann Chir Gynaecol* 1977;66:184-6.
  52. Keighley MR, Buchmann P, Minervini S, Arabi Y, Alexander-Williams J. Prospective trials of minor surgical procedures and high-fibre diet for haemorrhoids. *Br Med J [Clin Res]* 1979;2: 967-9.
  53. Abramson DJ. Elastic band ligation of internal hemorrhoids. *Milit Med* 1980;145:11-4.
  54. Tan WT, Foo KT. Rubber band ligation of haemorrhoids. *Singapore Med J* 1980;21:517-21.
  55. Wroblewski DE, Corman ML, Veidenheimer MC, Collier JA. Long-term evaluation of rubber ring ligation in hemorrhoidal disease. *Dis Colon Rectum* 1980;23:478-82.
  56. Murie JA, MacKenzie I, Sim AJ. Comparison of rubber band ligation and haemorrhoidectomy for second- and third-degree haemorrhoids: a prospective clinical trial. *Br J Surg* 1980; 67:786-8.
  57. Jeffrey PJ, Miller W, Ritchie SM, Hawley PR. The treatment of haemorrhoids by rubber band ligation at St. Mark's Hospital. *Postgrad Med J* 1980;56:847-9.
  58. Greca F, Hares MM, Nevah E, Alexander-Williams J, Keighley MR. A randomized trial to compare rubber band ligation with phenol injection for treatment of haemorrhoids. *Br J Surg* 1981;68:250-2.
  59. Cheng FC, Shum DW, Ong GB. The treatment of second degree haemorrhoids by injection, rubber band ligation, maximal anal dilatation, and haemorrhoidectomy: a prospective clinical trial. *Aust NZ J Surg* 1981;51:458-62.
  60. Lau WY, Chow HP, Poon GP, Wong SH. Rubber band ligation of three primary hemorrhoids in a single session: a safe and effective procedure. *Dis Colon Rectum* 1982;25:336-9.
  61. Murie JA, Sim AJ, MacKenzie I. Rubber band ligation versus haemorrhoidectomy for prolapsing haemorrhoids: a long term prospective clinical trial. *Br J Surg* 1982;69:536-8.
  62. Templeton JL, Spence RA, Kennedy TL, Parks TG, MacKenzie G, Hanna WA. Comparison of infrared coagulation and rubber band ligation for first and second degree haemorrhoids: a randomised prospective clinical trial. *Br Med J [Clin Res]* 1983;286: 1387-9.
  63. Adamthwaite DN, Markides N. Treatment of haemorrhoids with rubber band ligation. *S Afr Med J* 1983;64:585.
  64. Vyas KC, Gupta AS, Sharma RS. Clinical evaluation of surgical treatment of haemorrhoids. *J Indian Med Assoc* 1984;82:41-4.
  65. Frey KA. Rubber band ligation of hemorrhoids. *Am Fam Physician* 1984;29:187-9.
  66. Murphy KJ. Tetanus after rubber-band ligation of haemorrhoids. *Br Med J* 1978;1:1590-1.
  67. Alders N. Portal pyaemia with recovery. *Lancet* 1944;1:151.
  68. Holland JA, Hill GB, Wolfe WG, Osterhout S, Saltzman HA, Brown IW Jr. Experimental and clinical experience with hyperbaric oxygen in the treatment of clostridial myonecrosis. *Surgery* 1975;77:75-85.
  69. Colwill MR, Maudsley RH. The management of gas gangrene with hyperbaric oxygen therapy. *J Bone Joint Surg [Br]* 1968;50:732-42.
  70. Dellinger EP. Severe necrotizing soft-tissue infections: multiple disease entities requiring a common approach. *JAMA* 1981;246: 1717-21.
  71. Heimbach RD, Boerema I, Brummelkamp WH, Wolfe WG. Current therapy of gas gangrene. In: Davis JC, Hunt TK, eds. *Hyperbaric oxygen therapy*. Bethesda, MD: Undersea Medical Society, 1977:153-76.
  72. Demello FJ, Haglin JJ, Hitchcock CR. Comparative study of experimental *Clostridium perfringens* infection in dogs treated with antibiotics, surgery, and hyperbaric oxygen. *Surgery* 1973;73:936-41.
  73. Demello FJ, Hitchcock CR, Haglin JJ. Evaluation of hyperbaric oxygen, antibiotics, and surgery in experimental gas gangrene. *Proc 5th Int Hyperbaric Conf, Burnaby, Canada, Simon Fraser University, 1974:554-61.*