

PERFORATED WOUND OF THE RECTUM INTO THE POUCH OF DOUGLAS

CAUSED BY IMPALEMENT

JOHN H. POWERS, M.D., AND EDWARD S. O'MEARA, M.D.

COOPERSTOWN, N. Y.

FROM THE DEPARTMENT OF SURGERY OF THE MARY IMOGENE BASSETT HOSPITAL, COOPERSTOWN, NEW YORK.

BIZARRE wounds of the perineum and rectum by impalement are of interest because of their singularity, rarity, and sequelae. The methods by which these injuries are sustained are as numerous as the instruments which cause them; their severity depends upon the location and depth of the wound, the path of the penetrating instrument, and the damage to adjacent soft tissues, blood vessels, and viscera.

During the past several decades small collected series and isolated reports of such unusual injuries have appeared in the literature. The authors wish to record an additional case in which perforation of the anterior rectal wall and peritoneum by the handle of a mop was followed by a rapidly developing, fulminating peritonitis due to dissemination of liquid and solid fecal material throughout the pelvic peritoneal cavity.

Case Report.—(Hosp. No. 16649): P. U., male, age 18, slipped from the wet top of a table, and fell upon the handle of a mop which was leaning against the table, its handle rising several inches above the surface of the table. The blunt end of the handle, meeting the boy's perineum, carried him outwards, impaling him as he vaulted the arc through which the rigid implement directed the course of his body. The handle penetrated a pair of duck pants, heavy winter underwear, and entered the rectum for about eight inches (Fig. 1). The patient removed the instrument himself and, terrified, but not in pain, ran aimlessly for a distance of some 200 feet. He was immediately conscious of a desire to defecate but passed only a small amount of bright, red blood. He was then brought to the Camp Infirmary where 20 minutes later he began to experience generalized pain in the lower part of the abdomen. There was no local discomfort in the perineum except the urge to defecate which persisted. Within an hour of the accident he was seen by Dr. A. L. Wahl, who stated that at that time the boy's abdomen was generally rigid. His subjective distress did not demand the administration of a sedative. He was admitted to the Mary Imogene Bassett Hospital, three hours after the accident occurred.

Physical Examination: The patient was well developed, acutely ill, obviously in pain, nauseated, and vomiting at intervals. Temperature 100° F. by mouth, pulse 58, respirations 22.

Generalized abdominal spasm and board-like rigidity were present; tenderness was most marked below the level of the umbilicus. There was no distention. A small, irregular, superficial laceration was found in the perineum, extending into the anterior margin of the anus. On rectal examination no rupture of the rectum could be felt as far up as the examining finger could reach. Marked tenderness and moderate bog-giness of the prostate were present. Bloody mucus was observed on the examining finger. The remainder of the physical examination was essentially normal.

The hemoglobin and erythrocytic count were a little above normal; leukocytes

Submitted for publication February 21, 1938.

PERFORATED WOUND OF RECTUM

18,500, 85 per cent polymorphonuclear neutrophils. The bladder was evacuated with a soft rubber catheter and approximately 400 cc. of clear urine obtained, examination of which was normal except for four to eight erythrocytes and an occasional leukocyte per high-power field.

Tentative Diagnosis: Puncture wound of the perineum, perforation of the rectum, or bladder, or both, with generalized peritonitis.

Operation: Under ether anesthesia, the abdomen was opened through a midline, suprapubic incision, disclosing a generalized peritonitis, and the presence of liquid and

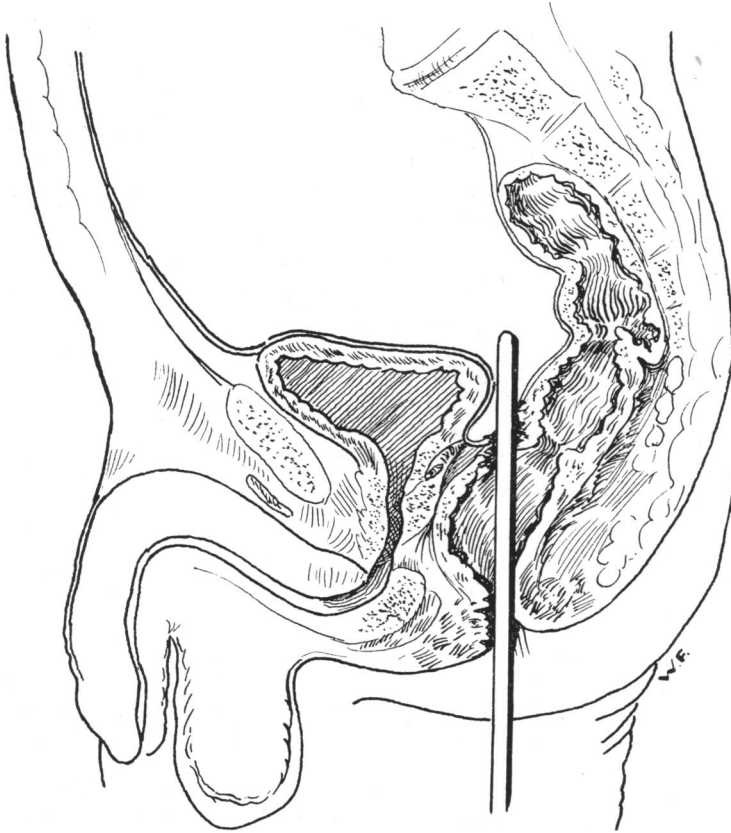


FIG. 1.—Median sagittal section illustrating the path of the mop handle through the perineum, anterior rectal wall, and pouch of Douglas into the peritoneal cavity.

solid particles of feces. As much of this fecal material as possible was removed with suction and the pelvis was walled off with Mikulicz pads. A perforation about one inch in diameter was seen in the pouch of Douglas and below this a perforation of corresponding size was found in the anterior wall of the rectum. The edges of the rectal mucosa were picked up with Allis forceps and closed with a running suture of No. 0 chromic catgut. The musculature was sutured in the same manner and the rent in the pouch of Douglas was closed and approximated to the wall of the rectum. One cigarette drain was placed in each side of the pelvis.

A loop of sigmoid was then brought out through a second small incision in the left rectus muscle near its lateral border. The midline incision was closed above and below the drains. A sigmoidostomy was immediately established. The patient was constantly cyanotic during the operation due to the presence of large amounts of mucus and other liquid material in the nostrils and rhinopharynx. However, he stood

the procedure well and left the table in fair condition. A slow intravenous drip of 5 per cent glucose in normal saline solution was started immediately after operation. As soon as he recovered consciousness he was placed in Fowler's position.

Postoperative Course: Rigidity and spasm of the abdominal wall diminished gradually and were entirely absent by the fifth postoperative day. Tenderness subsided rapidly. Drainage from the peritoneal cavity was at first moderate and consisted of thin, gray, foul-smelling fluid with the odor typical of that emanated by the anaerobic growth of *B. melanogenicus* and Streptococci.¹ The discharge became more profuse up to the tenth day and then gradually diminished. The drains in the pelvis were progressively withdrawn between the twelfth and fourteenth days. At first there was no fecal discharge from the sigmoidostomy; within a week of operation active peristalsis had commenced and the stoma was functioning satisfactorily. The abdominal wound healed uneventfully in spite of constant contamination from both the peritoneal cavity and from the artificial anus.

Within 24 hours after operation the patient developed a moist, crackling cough productive of a small amount of blood-tinged sputum. The temperature rose to 103° F., pulse to 140, and respirations to 40. Examination of the chest revealed dulness over the right lower lobe with bronchial breathing and numerous moist râles. A roentgenogram confirmed the diagnosis of pneumonia in the right lower lobe. During the following week the temperature came down by lysis, the physical signs in the chest diminished, and the patient's cough progressively disappeared.

As a preventive measure against the possible development of infection from *Cl. welchii* or other gas-forming anaerobic organisms the patient was given a prophylactic dose of polyvalent serum on the third and fourth postoperative days. Five days later he complained of soreness and aching in several of his joints and a diffuse, confluent, maculopapular eruption appeared over his entire body. At this time the temperature had again risen to 102° F., pulse to 108. A diagnosis of serum-sickness was made. The eruption disappeared two hours after its appearance, and the articular pains subsided within 24 hours; on the eleventh postoperative day the temperature fell to normal where it subsequently remained. Eleven days later the sigmoidostomy was closed. The lower intestinal tract functioned normally thereafter, and the patient was discharged in good health with both wounds healed.

Discussion.—Injury by impalement implies a fall onto the impaling instrument; in order to differentiate such lesions from the more common puncture wounds the falling body must play an active part, the impaling body a passive one. Such a description was followed by Stiassny² who collected and published summaries of 127 cases, in 1900. Five years later Tillmann³ added 16 more cases, and, in 1912, Habhegger⁴ summarized all the cases previously reported and added 36 additional ones which he had collected during the intervening seven years.

Incidence.—Injury by impalement is primarily a hazard of agricultural communities, yet only three such patients have been treated at the Mary Imogene Bassett Hospital, in a rural section of New York State, during the past eight years. Within this period there were 10,551 total admissions, 4,554 of which were surgical. Neumann⁵ reported 20 impalements in 16,000 patients treated at the Municipal Hospital in Friederichshain near Berlin, between 1880 and 1898, and Bircher⁶ found only two such cases in 16,000 surgical admissions to the Kant Krankenhaus in Aaran, an agricultural district of Switzerland. These statistics offer sufficient evidence of the rarity of this type of lesion.

Etiology.—Impalement is one of the many hazards of haying. Thirty

per cent of the reported cases have occurred among farmers⁴; falls from hay-lofts, stacks, and racks onto hay-hooks, pitchforks, rakes, and hoes are the more common methods by which this injury is sustained. Pitchforks and hay-hooks have been the impaling instrument in 26 per cent of cases. Those who work beneath the surface of the earth form the next largest group; miners, ditch-diggers, and well-drillers who run the risk of impalement on drills, picks, shovels, and gas pipes. Those who work above the surface of the earth form the third group, steeple-jacks, window-cleaners, masons, painters, and carpenters. Even the home is not safe, for many cases have been due to falls from windows and porches, stepladders, tables, and chairs onto picket fences, flower-stakes, broom-handles, and the legs of chairs and tables.

The other two injuries by impalement treated at this hospital, since 1930, were minor in character and were caused by accidents less infrequent than the case reported in detail. One was a laceration of the scrotum with extrusion of the testicle, due to a fall onto a picket fence; the other was a wound of the perineum through the sphincter ani into the rectum, sustained when the patient, who was evacuating his bowels in the woods, fell backward onto a stump.

The case herewith recorded is the only one which the authors have discovered wherein the victim was impaled on the handle of a mop.

Classification.—Habegger⁴ presents an elaborate classification and comprehensive description of wounds of this type. It seems, however, much simpler to divide them into two groups: One, in which the peritoneum is not injured; and two, those in which the peritoneal cavity is penetrated, with or without injury to any intra-abdominal viscera; peritonitis is always a complicating factor in the second group and a frequent cause of death.

In the majority of cases the direction of impact is from below upward, more or less parallel with the long axis of the body, and the point of entrance is through the anal orifice in the male and the vagina or anus in the female. The curved surfaces of the buttocks direct the impaling object toward the interischial space from which the pubis in front and the coccyx and sacrum behind guide it toward one of the two orifices. This mechanism applies particularly to blunt instruments, a pointed object being more likely to penetrate at the point of impact.

Diagnosis.—The severity of the immediate symptoms is frequently not directly dependent upon the extent of the injury, even when the peritoneal cavity has been penetrated. Subsequent symptoms are the consequences of infection and hemorrhage. Occasionally patients are not aware that a serious injury has occurred until several hours later. A careful history is important, obtained preferably from a witness to the accident, rather than from the patient. An inquiry regarding the depth to which the object penetrated, a thorough examination of the wound and all adjacent visible and palpable structures, and an attempt to visualize the direction of the impact are all of value in establishing an accurate diagnosis.

A knowledge of whether or not the bladder was full at the time of the accident, whether or not the patient voided during the interval between the accident and the examination, and whether he passed blood by urethra or by rectum is very helpful. The same is true of bleeding from the vagina in the female. Every patient with an injury by impalement of the external genitalia, perineum, anus, and rectum should be catheterized; the escape of grossly clear urine through the catheter is not definite evidence of the integrity of the vesical wall; neither does the presence of a few red cells in the urinary sediment offer positive proof that the bladder has been ruptured.

Proctoscopic examination is of unquestionable value in many cases⁷ when doubt exists regarding the continuity of the rectal wall.

Generalized abdominal tenderness and spasm may develop very rapidly, even though the peritoneal cavity has not been flooded with urine or blood. Shock may be due either to fulminating peritonitis or to severe hemorrhage.

Treatment.—Early operation is imperative in all cases where rupture of a hollow viscus is suspected. Suture of the viscus or viscera; aspiration of fecal material within the operative field; removal of foreign bodies; and adequate drainage of the peritoneal cavity are essential. A colostomy proximal to the wound probably affords greater safety during the early convalescence and less danger of leakage from the intestinal repair. Acute hemorrhage, either internal or external, must be checked. Rupture of the bladder demands suture of the wound and free drainage, preferably by the suprapubic route as more efficient than the transurethral.

As in all cases of collapse from severe trauma or overwhelming infection, primary therapy should be directed toward the treatment of shock before extensive operative intervention is undertaken.

Difference of opinion exists regarding treatment of the local perineal wound. Some authors advise extensive débridement; removal of all foreign matter; accurate hemostasis; and free drainage of the retroperitoneal space; others suggest the use of tampons to control bleeding and afford drainage. In the case herewith recorded the patient was operated upon soon after the accident occurred, the retroperitoneal space below the pouch of Douglas was not drained, and the external perineal wound, involving the anal orifice, was neither débrided nor packed; there was no cellulitis of the retroperitoneal tissues and the external wound healed well.

Mortality.—The statistics of Tillmann³ and Habhegger⁴ are of interest, although it must be remembered that Habhegger's series includes the cases previously collected by Tillmann; they may best be compared by the following tabulations (Tables I and II).

TABLE I

TABULATION OF THE STATISTICS OF TILLMANN AND HABHEGGER

	Tillmann ³	Habhegger ⁴
Total Number of Cases.....	143	179
Recoveries.....	105	131
Deaths.....	38	48
Mortality.....	26.05%	26.81%

PERFORATED WOUND OF RECTUM

TABLE II
MORTALITY OF DIFFERENT TYPES OF INJURIES BY IMPALEMENT

	Tillmann ³		Habhegger ⁴	
	Number Cases	Mortality Percentage	Number Cases	Mortality Percentage
Extraperitoneal impalements without injury to organs.....	57	7.01	69	7.02
Extraperitoneal impalements with injury to organs.....	29	0	36	8.02
Intraperitoneal impalements without injury to organs.....	19	31.66	28	25.00
Intraperitoneal impalements with injury to organs.....	34	76.47	42	78.57

It is apparent that intraperitoneal impalement with injury to organs is the most serious type of lesion and carries an exceedingly high mortality. Peritonitis is responsible for the vast majority of deaths; shock and hemorrhage account for a few immediate fatalities, and chronic sepsis for the late mortality.

The general principles suggested in the section on treatment offer the best prophylaxis against these unfortunate sequelae.

SUMMARY

An unusual case of impalement by the handle of a mop has been described in detail; the instrument entered the rectum through the perineum and penetrated the pouch of Douglas.

Fulminating peritonitis developed rapidly. The patient was operated upon four hours after the accident occurred; the postoperative convalescence was complicated by pneumonia and serum-disease; recovery followed.

Injuries of this type are rare. Their incidence, etiology, classification, diagnosis, treatment, and mortality have been discussed briefly.

Intraperitoneal impalement with injury of abdominal viscera is a very serious type of wound and carries an exceedingly high mortality. Peritonitis is responsible for the vast majority of deaths.

REFERENCES

- ¹ Altemeier, William A.: The Cause of the Putrid Odor of Perforated Appendicitis with Peritonitis. *ANNALS OF SURGERY*, 107, 634-635, April, 1938.
- ² Stiassny, Sigmund: Ueber Pfahlungsverletzungen. *Beitrage zur Klin. Chir. (P. V. Bruns)*, 28, 351-422, 1900.
- ³ Tillmann, H.: Die Verletzungen und Chirurgischen Krankheiten des Becken, Stuttgart. 158-175, 1905.
- ⁴ Habhegger, C. J.: Impaling Injuries of the Pelvis. *Wisconsin Med. Jour.*, 10, 449-463, and 500-529, 1912.
- ⁵ Neumann, Alfred: *Centralbl. f. Chir.*, 26, 782-784, 1899.
idem: *Deutsch. Med. Wchnschr.*, 25, 541-544, 1899.
- ⁶ Bircher, E.: Quoted by Habhegger.⁴
- ⁷ Klechner, M. S.: Impalement of Rectum; Operation and Recovery. *Amer. Jour. Digest. Dis. and Nutrit.*, 1, 604-605, 1934.