Peritonitis secondary to gastrointestinal perforation is the most common form of severe, acute intraabdominal infection.\textsuperscript{1,2} Perforation of the colon and rectum often occurs in elderly patients and is associated with a high death rate.\textsuperscript{1} Retroperitoneal perforations generally have a better outcome than free intraperitoneal perforations. As with all surgical emergencies, early diagnosis and treatment can profoundly influence the ultimate outcome. Voice change occurring after an endoscopic procedure is a subtle clue, suggesting gastrointestinal perforation with interstitial tracking of gas. This finding should prompt an aggressive search for further evidence of gastrointestinal perforation.

**CASE REPORT**

A 77-year-old man required a subtotal colectomy with end ileostomy and Hartmann’s procedure for medically intractable ulcerative colitis. Postoperatively, he enjoyed good health and underwent annual surveillance proctoscopy with biopsy. Sixteen years later, immediately after a routine surveillance flexible endoscopy with rectal stump biopsy, he complained of hoarseness. Physical examination 2 hours later revealed a soft, nontender abdomen, a chest clear to auscultation, and no swelling, tenderness or crepitus about the head or neck. He was released from hospital and returned home. Four hours later he returned to the hospital because of painless distortion of his facial features. When re-examined there was soft-tissue distension and crepitus of the periorbital, buccal, cervical and thoracic tissues. He felt well, was afebrile and had normal vital signs. His voice was high pitched with a squeaking quality, quite different from his normal voice. The trachea was midline. There was no stridor, and the chest was clear with no wheezing or crepitations. The abdomen remained soft and nontender, with normal bowel sounds and ileostomy function. The hemoglobin level was 144 g/L and the total leukocyte count was 13.0 × 10\(^9\)/L. Serum creatinine, amylase, electrolytes and glucose levels were normal.

Plain radiographs of the neck and thoracoabdominal cavities revealed gross pneumoperitoneum, pneumoretroperitoneum, pneumomediastinum and subcutaneous emphysema in the abdominal wall, upper thighs and cervical tissues (Fig. 1). These findings were confirmed on CT of the abdomen and pelvis with oral and rectal contrast media. There was a suggestion of a mucosal defect in the rectal stump although there was no leakage of rectal contrast medium or evidence of pelvic collection.

The patient was managed conservatively with nasogastric intubation, intravenous antibiotics and close clinical monitoring. He remained well without evidence of intra-abdominal or systemic infection. The soft-tissue swelling gradually subsided, and when he was discharged home on the fifth hospital day his voice was normal.

**DISCUSSION**

Perforation of the gastrointestinal tract is an uncommon but well-recognized complication of endoscopic procedures, having a reported incidence of between 0.15% and 3.0%.\textsuperscript{3 – 5} Symptoms of endoscopic perforation of the colon or rectum are determined by the size, site, mechanism and degree of contamination of the perforation, as well as the level of sedation, underlying health and delay in the patient’s presentation.\textsuperscript{4,5} Colonic perforations have been separated into 2 groups, depending on whether the perforation occurs during a diagnostic or therapeutic endoscopy.\textsuperscript{5,6} The highest risk of perforation occurs during therapeutic endeavours such as polypectomy or biopsy.\textsuperscript{5} These injuries
are more likely to be small localized ones that are often sealed by adhesion of peri-
olic fat, omentum or adjacent viscera. \(^{1,3,6}\) In contrast, injuries occurring during di-
agnostic endoscopic procedures are often caused by manoeuvring of the instrument
through tortuous or tethered bowel, re-
sulting in large longitudinal tears of the
antesenteric wall. \(^{5,6}\) Operative treatment
is therefore recommended for manage-
ment of a perforation that occurs after a
difficult diagnostic procedure.\(^{6}\)

Although the standard approach to
non-iatrogenic colorectal perforations is
immediate surgical intervention, \(^{2}\) injuries
occurring during therapeutic procedures
can be selectively managed nonopera-
tively. \(^{6,7}\) Operative exploration is required
though, if signs of peritonitis or sepsis de-
velop, if there is distal obstruction or if the
colon has been poorly prepared. \(^{4}\) Impor-
tant factors in managing a patient nonop-
eratively include a delay in diagnosis, the
presence of associated colonic disorders
and the overall health of the patient. \(^{5}\) Non-
surgical management should consist of in-
travenously administered antibiotics tar-
geted against facultative gram-negative
and anaerobic organisms, bowel rest, na-
so gastric decompression and frequent clin-
ical assessment. \(^{5}\)

Retroperitoneal perforations may be
more clinically occult than free intraperi-
toneal perforations, and any aid to earlier
diagnosis is thus important. Pneu-
moretroperitoneum may originate from
the disruption of cutaneous or gastroin-
testinal mucosal barriers, infection with
gas-forming organisms or rupture of the
respiratory tract or alveoli, \(^{4}\) although it
usually reflects a breach in the integrity of
some portion of the gastrointestinal tract.
The volume of extravasated air correlates
poorly with the clinical severity of the per-
foration. \(^{5}\) Endoscopic perforations with
pressurized insufflation will create more
extensive gas more frequently than the
more sinister but lower pressure causes of
pneumoretroperitoneum, such as compi-
cated duodenal ulcer, inflammatory bowel
disease or diverticulitis. \(^{5}\) Gas reaches the
cervical planes by dissecting through the
retroperitoneal, mediastinal and cervical
tissue planes. \(^{4-6,8}\)

Post-endoscopic voice changes likely
occur because of changes in the shape and
length of the supralaryngeal vocal tract
(nose, mouth, pharynx), secondary to me-
chanical embarrassment arising from para-
pharyngeal emphysema. \(^{9,10}\) Kirk and associ-
ates \(^{9}\) described 2 cases of colonic per-
foration, 1 occurring after colonoscopy,
and the other after a barium enema, both of
which resulted in retroperitoneal and in-
trapерitoneal air, pneumomediastinum
and extensive subcutaneous emphysema.
Both patients exhibited a high-pitched voice
that returned to normal with resolution of the
subcutaneous emphysema. \(^{9}\) Another case of
change in voice representing the first sign
of rectal perforation was reported by
Rabin and colleagues. \(^{10}\)

CONCLUSIONS

Nonoperative management of colorec-
tal perforations during endoscopic proce-
dures has become an accepted manage-
ment option in selected patients. A crucial
factor in the success of this approach is
early diagnosis and treatment of the perfo-
ration. A change in voice after a colorectal
procedure is a subtle clinical clue that
should prompt investigation to determine
whether a perforation has occurred.

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