

## Case Report

# Air, Air Everywhere- A Rare Entity

Gazal Singla, Shikha Sood, Sanjeev Sharma

Department of  
Radiodiagnosis and Imaging,  
IGMC, Shimla,  
Himachal Pradesh, India

ABSTRACT

Upper gastrointestinal (GI) endoscopy is a widely used diagnostic and therapeutic procedure. Gastric perforation causing pneumothorax, pneumomediastinum, pneumoperitoneum, pneumorrhachis, and subcutaneous emphysema after upper GI endoscopy is an extremely rare complication. We present an interesting case of a 58-year-old male who presented to the Emergency Department with recurrent vomiting, abdominal pain and diffuse swelling over abdomen, chest, neck bilateral arms, and thighs after undergoing an endoscopy for a gastric mass.

**KEYWORDS:** *Pneumomediastinum, pneumoperitoneum, pneumorrhachis and subcutaneous emphysema, pneumothorax*

## INTRODUCTION

Upper gastrointestinal (GI) endoscopy with simultaneous gastric biopsy is a common procedure used for the diagnosis and confirmation of upper GI disorders. Complications of upper GI endoscopy include cardiorespiratory problems, infection, bleeding, and perforation. Perforation is very rare and estimated in 0.03% of cases.<sup>[1]</sup>

Perforation leading to pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, pneumorrhachis, and subcutaneous emphysema is an extremely rare event as encountered in our case.

## CASE REPORT

A 58-year-old male adult came to the Emergency Department complaining of abdominal pain, vomiting, two episodes of hematemesis, swelling over abdomen, chest, neck, and in both arms and thighs for the past 12 days. This swelling was increasing progressively. The patient had undergone GI endoscopy 12 days back which was done by a general physician in a district hospital which revealed circumferential friable ulcerated growth in antropyloric region of the stomach. Biopsy was taken from the anterior wall of stomach in antropyloric region which revealed adenocarcinoma of the stomach. Since it was done as an OPD procedure, the patient went home afterward (in a remote village). He started developing discomfort and pain 3 days after

the procedure to which he took treatment at village level only. He might have attributed his illness after biopsy procedure to his underlying disease. When he was not relieved of his symptoms, he came back to the same district hospital (11<sup>th</sup> day after the procedure) from where he was referred to our institute.

On examination, crepitus was noted over the chest wall, neck, upper arm, thigh, and over abdomen. Vital parameters were normal. No features of respiratory distress were noted. The patient was nondiabetic. He was a smoker with 10 pack-year smoking history. All laboratory parameters were normal except for low Na<sup>+</sup> (118 mmol/L) and low K<sup>+</sup> (3 mmol/L).

The patient underwent chest and abdomen X-ray and chest and abdomen contrast-enhanced computed tomography (CT). On X-rays, there was the presence of subdiaphragmatic air along with pneumoperitoneum and subcutaneous emphysema in chest wall and in thigh region [Figures 1 and 2].

CT scan showed circumferential growth of antropyloric region of the stomach. There was subcutaneous emphysema in bilateral (B/L) axilla, neck, thigh, interspinous muscle with B/L pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, and pneumorrhachis along

**Address for correspondence:** Dr. Gazal Singla,  
Department of Radiodiagnosis and Imaging, IGMC,  
Shimla - 171 001, Himachal Pradesh, India.  
E-mail: drgazalsingla22@gmail.com

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with ascites [Figures 3-8]. The patient was managed conservatively and showed improvement.

**DISCUSSION**

Upper GI endoscopy and biopsy is a commonly performed OPD procedure and usually carries a low risk of adverse effects ranging from 1 in 200 to 1 in 10,000 with mortality rates from none to 1 in 2000.<sup>[2]</sup>

Complications are divided into major and minor ones. Throat and abdominal discomfort are common minor complications whereas major complications include cardiorespiratory problems, infection, bleeding, perforation, and complications related to anesthesia. Perforation during diagnostic upper GI endoscopy is very rare with an incidence of 0.03% and mortality of 0.001%.<sup>[1]</sup> Perforation usually occurs at the site of pathology. Perforation accounts for 41% cases of pneumoperitoneum.<sup>[3]</sup>

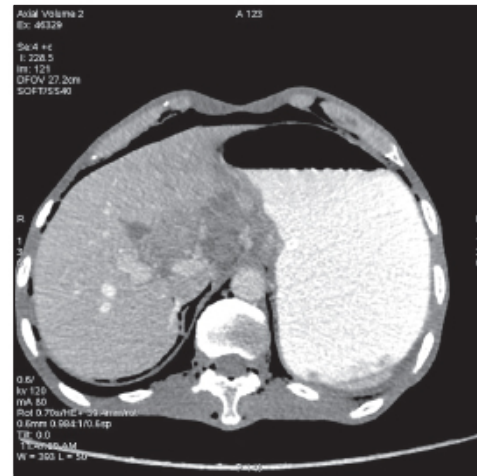
There are only sporadic case reports regarding massive air leak following upper GI endoscopic

biopsy. Fujii *et al.* and Ferrara *et al.* reported single cases of B/L pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, and subcutaneous emphysema secondary to endoscopic retrograde cholangiopancreatography.<sup>[4,5]</sup> Falidas *et al.* reported a case of pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, and massive subcutaneous emphysema following diagnostic colonoscopy.<sup>[6]</sup> Bonet *et al.* reported a case of pneumothorax, pneumomediastinum, pneumoperitoneum, and subcutaneous emphysema with double lumen tube for thoracoscopy vertebral body stapling in a pediatric patient.<sup>[7]</sup>

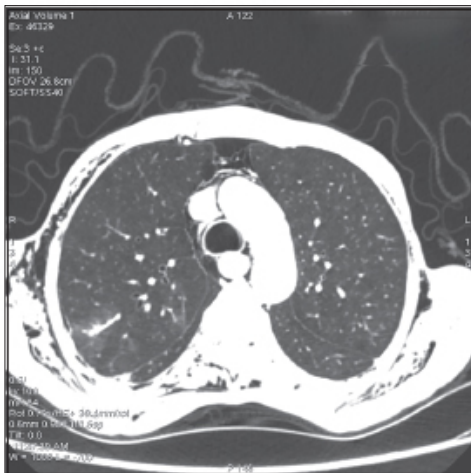
Literature revealed no such case in which massive air leak leading to B/L pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, pneumorrhachis, and subcutaneous emphysema have occurred secondary to upper GI endoscopy followed by biopsy.



**Figure 1:** X-ray showing pneumoperitoneum



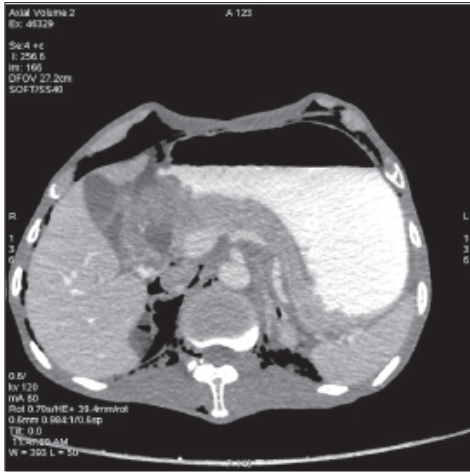
**Figure 2:** Contrast-enhanced computed tomography showing air in spinal canal suggestive of pneumorachis



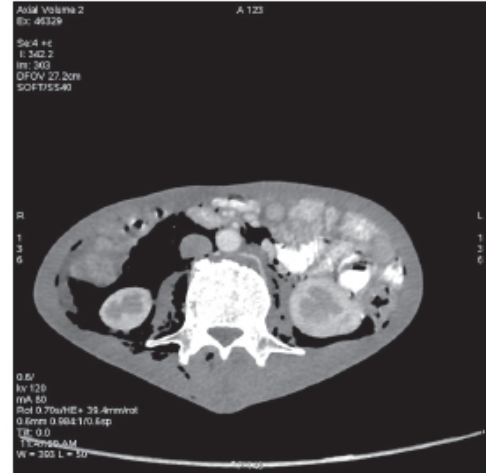
**Figure 3:** Contrast-enhanced computed tomography lung window images showing subcutaneous emphysema in bilateral axilla



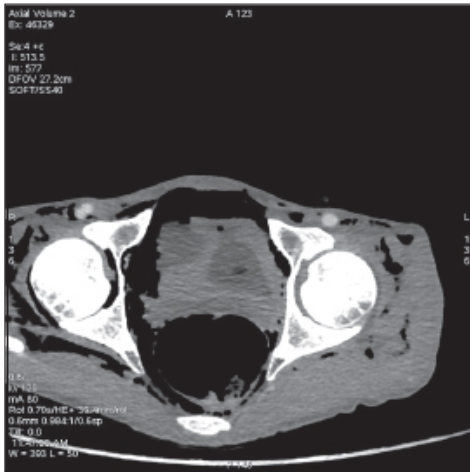
**Figure 4:** X-ray showing subdiaphragmatic air



**Figure 5:** Contrast-enhanced computed tomography abdomen showing growth in antropyloric region of stomach



**Figure 6:** Contrast-enhanced computed tomography showing pneumoperitoneum



**Figure 7:** Contrast-enhanced computed tomography showing pneumoretroperitoneum



**Figure 8:** Contrast-enhanced computed tomography lung window images showing pneumothorax and pneumomediastinum

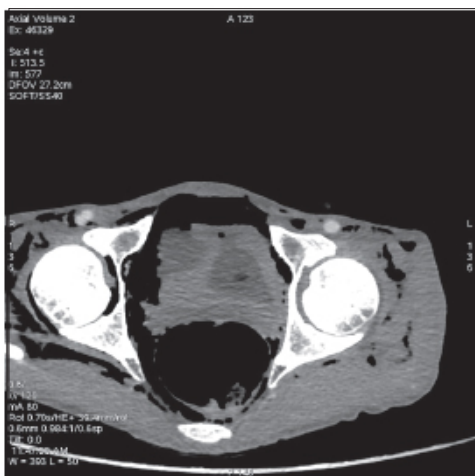
When leakage of gas is greater than resorption, progressive accumulation of gas occurs in various tissue compartments. Air can travel from peritoneum to mediastinum and vice versa by two routes. First, through the defect between the sternal origin of diaphragm, second through foramen of Morgagni. Foramen of Morgagni is a site where endothoracic and transversalis fascia blends. Inferiorly, these two fascia are continuous behind the diaphragm at lumbosacral arches, aortic hiatus, and diaphragmatic hiatus thus providing communication between mediastinum and retroperitoneum.<sup>[8]</sup>

Visceral and retropharyngeal spaces directly communicate with the mediastinum, creating a conduit for the movement of air between mediastinum and neck. The extraperitoneal compartment in the pelvis communicates with the subperitoneal space in the anterior abdominal wall anteriorly and retroperitoneum posteriorly, hence easily allowing spread of air between them. Further, femoral sheath and fascial investments of some muscles

provide anatomic pathway of spread of air from pelvis to the buttocks, hips, and thigh.<sup>[8]</sup>

Air can dissect the paraspinal soft tissue reaching into the epidural space of spinal canal through neural foramina and along vascular and nerve root sheath leading to pneumorrhachis [Figure 9].<sup>[9]</sup>

The management of a patient of malignancy of stomach with perforation and peritonitis is still debated. Preoperative or prebiopsy diagnosis of malignancy is unusual, accounting for about 30% of cases, in other patients, a presumptive diagnosis of gastroduodenal perforation is made. A histologic determination is fundamental for the surgeon to choose the type of operation and to perform it with oncological criteria. Thus, in a patient with a histological diagnosis of perforated gastric carcinoma, emergency surgery is done only after due consideration of certain factors which are: the presence of preoperative shock, the gravity of



**Figure 9:** Contrast-enhanced computed tomography showing subcutaneous emphysema in bilateral thigh

peritonitis, the curability of the neoplasm, and eventual comorbidities of the patient.<sup>[10]</sup>

## CONCLUSION

Our patient presented with B/L pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, pneumorrhachis, and massive subcutaneous emphysema due to gastric perforation as a complication of gastric biopsy. Although it is an extremely rare event gastroenterologist must be aware of this complication during biopsy procedure, and adequate measures must be taken to prevent mortality.

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## Conflicts of interest

There are no conflicts of interest.

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