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Recognizing the Macklin Effect in Patients with Persistent Vomiting: A Case Report of a Paratesticular Rhabdomyosarcoma

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ABSTRACT

The Macklin effect is a rare but important cause of pneumomediastinum resulting from alveolar rupture and air dissection along bronchovascular sheaths, often triggered by forceful vomiting. We report a 17-year-old male with high-risk paratesticular embryonal rhabdomyosarcoma who underwent placement of an uncovered metallic duodenal stent for malignant obstruction. Persistent tumor-related duodenal obstruction led to repeated vomiting, and follow-up contrast-enhanced CT demonstrated pneumomediastinum with linear air tracking along bronchovascular bundles, consistent with the Macklin effect. Concurrently, CT revealed significant retroperitoneal tumor progression and tumoral ingrowth into the duodenal stent, explaining continued gastric outlet obstruction. This case highlights the importance of recognizing the Macklin effect in oncologic patients with persistent vomiting, differentiating it from esophageal perforation, and underscores the central role of CT in evaluating both abdominal tumor progression and secondary thoracic complications.

KEYWORDS :

Rhabdomyosarcoma, Vomiting-induced Macklin effect, Paratesticular tumor, Retroperitoneal mass, Duodenal stent.

MAIN ARTICLE

INTRODUCTION

Rhabdomyosarcoma (RMS) is the most common soft tissue sarcoma in children and adolescents, with the embryonal subtype representing the majority of cases [1,2]. Paratesticular RMS in adolescents carries an increased risk of retroperitoneal nodal dissemination and aggressive locoregional growth [3].

Gastric outlet obstruction may occur secondary to large retroperitoneal masses, sometimes necessitating placement of self-expanding metallic stents (SEMS) for palliation [5]. Uncovered SEMS, however, are prone to tumoral ingrowth, which can lead to persistent obstruction and repeated vomiting.

The Macklin effect describes alveolar rupture due to abrupt intra-alveolar pressure increases, with air dissecting along peribronchovascular sheaths into the mediastinum [6]. In patients with malignant obstruction, forceful vomiting can trigger this phenomenon, resulting in pneumomediastinum and cervical emphysema. Recognition on CT is essential to avoid misdiagnosing life-threatening conditions such as esophageal perforation. We report a case of vomiting-induced Macklin effect secondary to duodenal stent tumor ingrowth in a patient with high-risk paratesticular RMS.

CLINICAL PRESENTATION

A 17-year-old male with high-risk paratesticular embryonal rhabdomyosarcoma underwent esophagogastroduodenoscopy (EGD) for malignant duodenal obstruction, with placement of an uncovered self-expanding metallic duodenal stent.

Despite intervention, the patient continued to experience severe abdominal pain and persistent vomiting.

CT-SCAN FINDINGS

Significant enlargement of a heterogeneous retroperitoneal mass demonstrating heterogeneous enhancement, intralesional air bubbles, marked mass effect on small bowel loops and transverse colon, causing digestive stasis, and tumoral ingrowth into the duodenal stent with intrastent air was noted, indicating stent invasion (Figures 1A,1B).

Pneumomediastinum and cervical subcutaneous emphysema, linear air collections along bronchovascular sheaths consistent with the Macklin effect (Figures 2A,2B).

DISCUSSION

This case illustrates the Macklin effect as a secondary complication of persistent vomiting caused by tumor-related duodenal obstruction. Retroperitoneal progression of paratesticular RMS led to incomplete stent decompression, resulting in repeated forceful vomiting. This caused alveolar rupture and air dissection along bronchovascular sheaths into the mediastinum and cervical soft tissues, visible on CT (Figures 2A,2B).

Recognition of the Macklin effect is crucial in oncologic patients with vomiting because pneumomediastinum may otherwise suggest esophageal perforation, a potentially life-threatening condition requiring urgent intervention [6]. In this patient, the absence of mediastinal fluid collections, esophageal wall discontinuity, or pleural effusion supported the benign alveolar origin of pneumomediastinum.

Additionally, CT allowed simultaneous assessment of tumor progression and stent patency. Intrastent tumoral ingrowth was clearly visible, explaining persistent obstruction and guiding further multidisciplinary management (Figures 1A,1B). This case highlights the value of CT in providing a comprehensive evaluation of both abdominal tumor burden and secondary thoracic complications in patients with high-risk RMS.

CONCLUSION

The Macklin effect should be considered in oncologic patients with persistent vomiting, particularly when stent obstruction or tumor-induced gastric outlet obstruction is present. Contrast-enhanced CT allows differentiation from esophageal perforation, identifies tumor progression, and assesses stent complications. Radiologists must recognize this phenomenon to guide timely and appropriate management in patients with aggressive abdominal malignancies.

FIGURES

Figure 1 : Coronal (A) and sagittal (B) contrast-enhanced CT images showing a heterogeneous retroperitoneal mass exerting mass effect on the small bowel loops and the transverse colon. Tumoral ingrowth into the duodenal stent is noted, with the presence of intrastent air (red arrow).

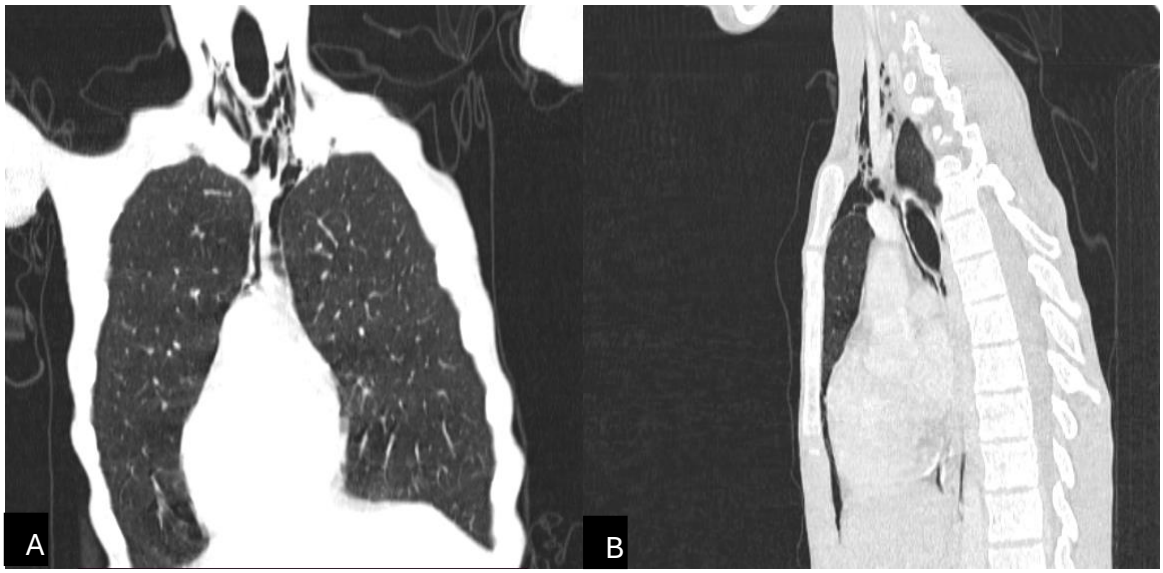

Figure 2: Coronal (A) and sagittal (B) CT images showing neumomediastinum and cervical subcutaneous emphysema, linear air collections along bronchovascular sheaths consistent with the Macklin effect.

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