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Post-Radiation Small Intestine Occlusion: A Case Report and Review of the Literature

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Abstract **Case Report**

Radiation obstruction is a serious complication of radiation enteropathy. It occurs in patients undergoing radiotherapy for gynecological or rectal cancer. Its management requires special attention to improve the survival of these patients. Based on a case who underwent surgery for cervical cancer and who presented an occlusion on stenosis of the small intestine coves, we will describe the pathophysiology of this rare entity and illustrate the value of imaging in the management of this pathology.

Keywords: Radiation obstruction, enteropathy, rectal cancer, pathophysiology.

INTRODUCTION

Radiation therapy is an important treatment modality for rectal, cervical, uterine, bladder, prostate and testicular cancer [1]. Fifty percent (50%) of patients receive radiation therapy during the treatment of major cancers [2]. The harmful effects of radiotherapy can occur early or late even after the problem for which it was indicated has been resolved. In the gastrointestinal tract, lesions may involve all segments [2]. We report a case of small intestine obstruction on post-radiation stenosis occurring after 5 years and emphasis will be placed on the pathophysiology and the role of imaging to confirm the diagnosis.

PATIENT AND OBSERVATION

This is a female patient, 64 years old, followed for cervical tumor. She underwent in 2018, a total colpo-hysterectomy and then treated with radiotherapy and postoperative chemotherapy. After 5 years, the patient was readmitted for an occlusive syndrome. The ASP done in the emergency room showed the presence of hydroaerosic levels (Figure 1), and an abdominal CT scan requested afterwards showed a regular circumferential thickening of small intestine as shown on the sagittal coronal and axial sections of the CT (Figure 2 and Figure 3). In addition, this thickening resulted in significant diffuse distension of aerial content upstream. To evaluate the nature of the thickening, a complementary abdominopelvic MRI was performed. We performed T1, T2, diffusion, and T1 FATSAT weighted sequences with Gadolinium injection. MRI noted stenosing thickening of small intestine coves with upstream distension. Finally, the diagnosis of post-radiation occlusion was retained. The patient underwent a segmental small bowel resection with terminal anastomosis and a simple postoperative course.

Figure 1

Figure 2

Figure 3

DISCUSSION

Radiation enteropathy is a functional disorder of the intestinal tract that occurs during or after radiation therapy to the abdomen, pelvis, or rectum [3]. Radiation therapy is used as an independent treatment, or adjuvant treatment in gynecologic cancers and as neoadjuvant treatment in rectal cancer. Radiation-induced obstructive bowel lesions represent between 0.8 and 17%. Its complex etiopathogeny does not depend only on overdose or technique used but can occur at any time postoperatively in the patient who has undergone surgery and neoadjuvant radiotherapy [4, 5].

Physiopathology:

Factors favouring radiation toxicity are known. The literature distinguishes between patient-related and radiotherapy-related factors. The first group includes obesity, hypertension, smoking, arterial disease, diabetes and a history of inflammatory bowel and colonic disease, previous abdominal surgery and peritonitis. The second group includes a dose >45 Gy with a Daily dose > 2 Gy, postoperative radiotherapy being more toxic than preoperative [5, 6]. Previous abdominal or pelvic surgery has been associated with an increased risk of developing obstructions in patients receiving >50 Gy [7]. Acute toxicity begins after a few days to 6 months of radiation therapy, whereas chronic toxicity is observed between 18 months and 30 years after radiation therapy [4]. Irradiation generates free radicals that are responsible for the disruption of single- or double-stranded DNA, damage to the cytoplasmic membrane and creation of apoptosis [6]. After inflammation, radiotherapy will induce fibrosis responsible for obstruction and impediment to the flow of digestive contents that may indicate a medical-surgical emergency [8]. In addition to obstruction, irradiation induces ulceration, perforation, bleeding and fistula at a later stage [7, 8]. Occlusion secondary to post-radiation stenosis is a severe form of the complication of radiation enteritis [4]. Our case had a stepped gallbladder involvement (Figure 5).

Diagnosis:

The symptomatology is superimposed on that of occlusions in general and includes nausea, vomiting, abdominal pain, abdominal distension and cessation of matter and gas [6]. Imaging is becoming an essential tool to confirm the diagnosis, whereas before, confirmation was done by histology after laparotomy or endoscopic biopsy. The current trend is based on imaging, especially with the development of MRI, which has also modified the treatment. It allows a positive diagnosis, etiology, location, extent, and degree by specifying possible complications (perforation, fistula, abscess or collections) [8].

Computed Tomography (CT):

Allows a positive diagnosis of the occlusion. The diagnostic rate of intestinal obstruction is estimated at 73 and 95% [8]. CT has a sensitivity of 63%, specificity of 78% with an accuracy of 66% [9]. Thanks to the CT scan, we can individualize the zone of disparity of caliber upstream of which there is a digestive distension greater than 50 mm for the colon and greater than 25 mm for the small intestine with a regular circumferential thickening that stenoses and measure its extent. In case of radiotherapy in a patient operated for digestive cancer, the challenge of CT is the non specificity to decide between tumor recurrence, second radiation-induced cancer or radiation toxicity. CT with gastrograffin opacification can show, in the aftermath of pelvic radiotherapy, the injured segments and help to prevent the evolution towards obstruction [3].

Magnetic Resonance Imaging (MRI):

Is the gold standard of diagnosis. It is an imaging technique that no longer exposes the patient to X-rays and saves the patient from undergoing a major procedure, facilitates early diagnosis and guides treatment. A 1.5 Tesla system is frequently used. The administration of antiperistalsis or antispasmodics improves image quality. Morphological T1 sequences

before and after injection of Gadolinium chelate and T2 sequence are required. The diffusion sequence, which confirms the diagnosis, is strongly recommended in this indication and helps to eliminate differential diagnoses [8]. It notes the absence of diffusion restriction. According to the French health authority, the unprepared abdominal X-ray used in previous studies is of little interest at present [2].

Differential Diagnoses:

Imaging helps to eliminate the main differential diagnoses, namely reflex ileus, mesenteric ischemia, metastases, tumor recurrence or second radiation-induced cancer, postoperative sclerosis or fibrosis [9, 10].

Treatment:

Radiation enteritis can be managed conservatively with corticosteroid therapy or other anti-inflammatory agents or endoscopic application of formalin to the intestines [1]. In cases of chronic enteropathy complicated by obstruction, surgery by laparotomy or laparoscopy is indicated to avoid progressive necrosis, prolonged hospital stay and even mortality [1]. It consists of resection of the affected segment and anastomosis. Nevertheless, there is an increase in the percentage of re-interventions in case of post-radiation occlusion in operated patients, which is estimated between 34 and 60% [4]. To overcome this risk and to increase the survival of the patients, we opt for an endoscopic balloon dilatation associated with an intra-lesional injection of corticotherapy and to make a simple colostomy of discharge. The success rate for this technique is around 97% with a risk of < 3% [6]. Monitoring with imaging of these patients and correction of nutritional disorders is a prerequisite to prevent these severe complications [6].

Prognosis:

Postoperative morbidity is 30% while mortality due to radiation occlusion ranges from 10% to 33% [10]. Surgery is complicated by extensive fibrosis and adhesions, and should be avoided whenever possible.

CONCLUSION

Post-radiation small intestine stenosis is a rare complication. The clinician and the radiologist must think about it in case of digestive obstruction in the patient undergoing radiotherapy. MRI plays a major role in confirming the diagnosis and eliminating a malignant cause. Its treatment is essentially surgical within a short time frame to prevent morbidity and mortality, which is not rare in this population.

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