Case report

Occlusion of the small intestine associatedwith acute radiation enteritis: case report

UNDER PEER REVIEW

Abstract :

Aims: Radiotherapy of the abdomen and pelvis can cause acute or chronic damage to the small intestine wall, known as radiation enteritis. And latetoxicity can occur up to 30 yearsafterradiotherapy cessation, which can makediagnosischallenging.

Study Design:Case report.

Presentation of the case :

We present the case of a 57-year-old woman with acute intestinal obstruction associated with radiation enteritis.The patient presented with abdominal pain associated with an occlusive syndrome, nausea, faecal vomiting, diffuse abdominal distension and tenderness with an empty rectal ampulla on physical examination, and a mild elevation of C-reactive protein.

Imaging revealed a discrepancy in the caliber of the small intestine at the level of the hysterectomy site, with upstream dilatation of the small intestine. The patient did not improve under medical supervision and underwent an exploratory laparotomy, which revealed an aspect of radiation enteritis with a bridle at the hysterectomy site, which was sectioned. The patient was discharged from hospital on the fifth postoperative day.

Discussion:

Radiation enteritis is a complication of abdomino-pelvic radiotherapy. It is difficult to diagnose and is generally based on CT scan findings in the context of recent exposure.The management of patients with these lesions is made more complex by the progressiveness and extent of the radiation disease and the risk of progression to the primary cancer, in addition to the considerable undernutrition, and focuses essentially on symptoms as well as balance and nutritional support, apart from complications that may require surgery.

Conclusion: The prevalence of radiation enteritis is likely to increase in the future. Hence the importance of optimising preventive measures to improve patients' quality of life.

Abbreviations: RT : radiation therapy; RE : radiation enteritis

Keywords:Radiation enteritis; diagnosis; Radiotherapy; conservative treatment; Small bowel; CT imaging; preventive measures.

Introduction :

Radiotherapy (RT) is an essential part of the therapeuticarmamentarium for cancers of the abdomino-pelvicregion (gastrointestinal, urological and gynecological cancers) [1], usedalone or in combination withchemotherapy and/or surgery.

REis a complication of abdomino-pelvicRT, defined by the presence of acquiredmorphologicallesions of the intestinal mucosa and wall.

Whilemuchisknown about the late intestinal sideeffects of radiation, relativelylittle has been published about its acute complications.

Wepresent a case of gallbladderbowel obstruction on acute radiation enteritis.

Case presentation :

The patient was 57 yearsold and hadundergonesurgery for endometrialcarcinoma (07/2021). Subsequently, the patient receivedexternal RT as adjuvant treatmentstarted on 05/10/21 at a rate of 2 Gy per session.

Afterthree sessions, the patient wasadmitted to the emergency department for an occlusive syndrome evolving for 7 days, characterized by cessation of bowelmovements and gaswithfecalvomiting. Distension; diffuse abdominal tenderness and empty rectal ampulla on physicalexamination.

A non-injection abdominal CT scan revealed a discrepancy in grecliccaliber at the level of the hysterectomy loge withupstream dilatation measured at 61 mm and hydro-aericlevels (NHA) with a flat colon, absence of progressive tumor process and signs of severitynamelyperitoneal effusion or pneumoperitoneum [Figure 1].

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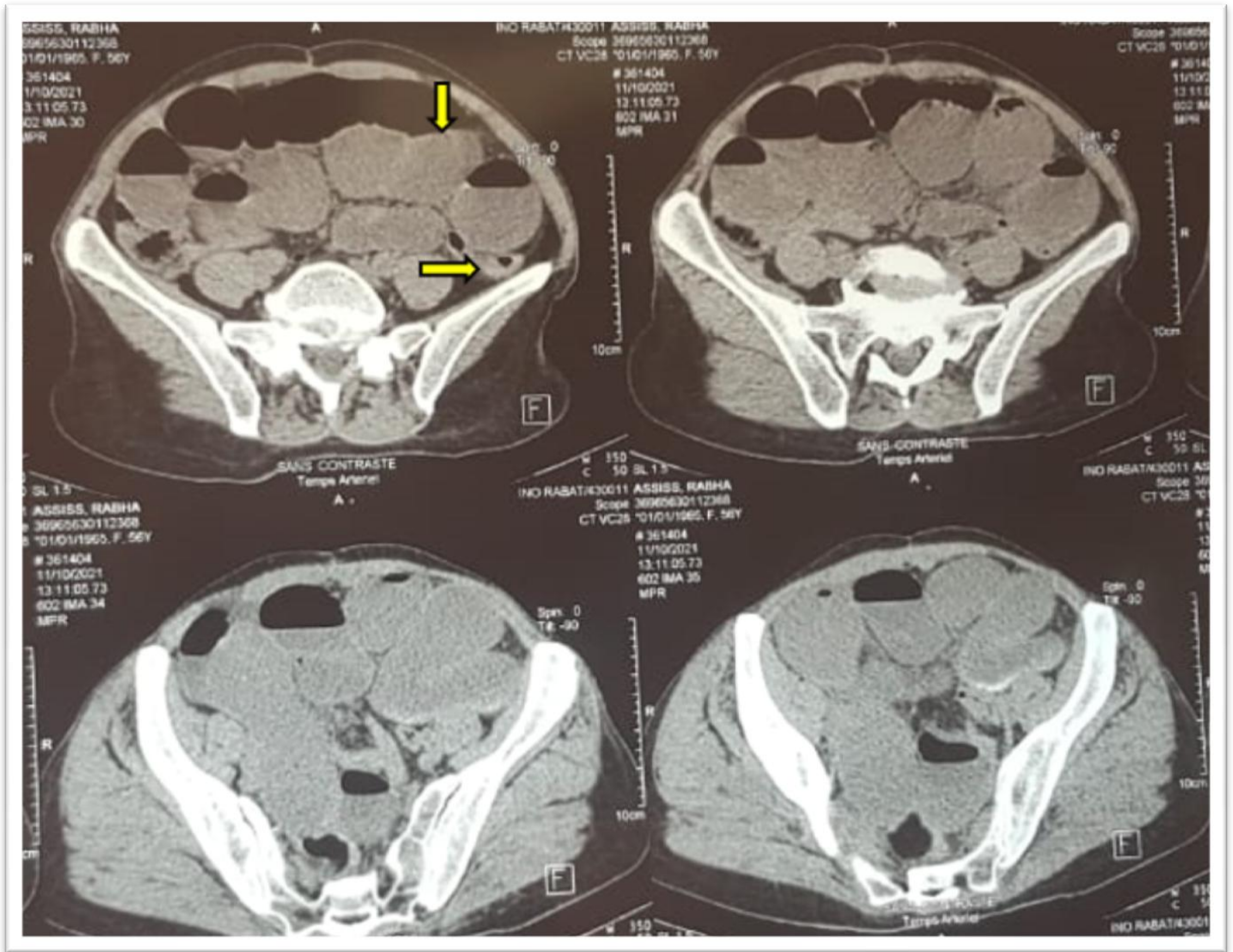

Figure 1:Abdomino-pelvic C- scan (cross-section): gallic occlusion (Arch: gallic NHA; flat colon)

Biological tests showedhyponatremia at 120 mEq/l, correct kalemia at 4.2 mEq/l, hypochloremia at 76 mEq/l, CRP at 12.97 mg/l, WBC at 3.67 10 /ul.^{3}

Patient wasconditioned, givenappropriateresuscitation to correct electrolytedisorders and admitted to surgery.

Given the persistence of signs, the patient wasadmitted to the operating theatre 24 hoursafter admission. Investigation afterretrogradeemptyingrevealedradiating segments of the terminal small intestine justupstream of the gallbladder**[figure 2]**, withgallbladders at the hysterectomy site responsible for the occlusion.

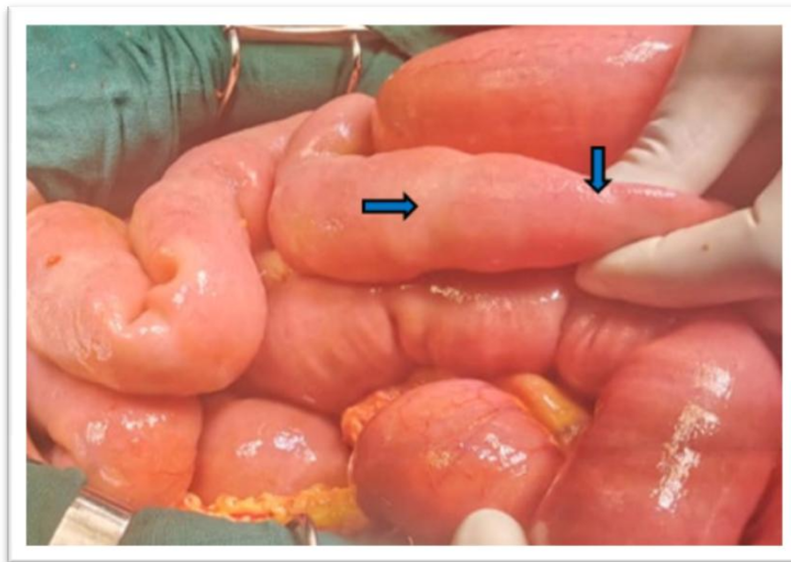

Figure 2:Intraoperative image showingradiatingsmallbowel.

Patient underwentadhesiolysis and debridementwithoutsigns of suffering of the wall of the small intestine at itsdetachment, with a correct viability of the segment of the small intestine caught by the flange and its lumen waspermeableduring the anterogradeemptying.

Post-operative follow-up wasfavourable, with transit resumption on the first day, progressive feedingwasrecommendedwith good evolution and simple follow-up, discharge on the fifthdaywith a check-up in 03 weekswhichwasfavourable.

The patient resumedRT on 08/11/21, receiving 23 sessions at 2 Gy per session (46 Gy in total), ending on 03/12/21. With 04 brachytherapy sessions started on 21/12 at a rate of 07 Gy per session, the evolutionwas favorable.

Discussion

RT of pelvic cancers isassociatedwith the occurrence of clinical digestive radio lesions, whichmay affect various segments of the digestive tract exposed to RT, but smallbowelinvolvementis the mostfrequent and severe [1].

The impact of these long-term radiation injuries on the digestive tract isfairlywellknown, whiletheir acute complications have been the subject of few publications [2].

Pathophysiology of RE :

Because of itsanatomical position, the small intestine is at riskduringabdominopelvic irradiation. The riskisincreasedwhen the intestinal loopstake the place of the organ(s) removedafterabdomino-pelvicorganresection. This isparticularly the case after total hysterectomy for cancer, or afterproctectomy for rectal cancer. [19]

Acute radiotoxicity corresponds to damage to the mucosalcryptcells and microvascularendothelium[3], with the normal villousepithelium of the intestine beingreplaced by non-functionalcells, resulting in loss of the barriereffect, and consequent abdominal pain and accelerated intestinal transit, with major repercussions on nutritionalstatus in relation to permeability and absorption disorders. Thesedisorders are usually multiple and involve all nutrientcategories (hematopoieticvitamins, water and electrolytes). [20]

Risk factors for radiation enteritis

Severalfactorsrelated to RT modalities and/or the patient predispose to radiation enteritis

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The degree of damage varies betweenindividuals and isinfluenced by genomicsusceptibility to ionizing radiation [18].

Although modern protocolspayingparticular attention to dose/fractionation, field size, layout and immobilization techniques can reduce the damage sustained, a dose of 30Gy or more can inducemucosal damage in 90% of patients, withdiarrheadevelopingwithintwoweeks [4].

The consequences of irradiation alsodepend on intrinsic patient factors and concomitant treatment, which must betakenintoaccountwhen planning RT.

Namely, the combination of RT withchemotherapy, which multiplies gastrointestinal toxicity. [21]

Patient-relatedriskfactors (smoking, hypertension, diabetes) or, more rarely, micro-angiopathies can alsoincrease intestinal toxicity. As can the presence of chronicinflammatoryboweldisease (IBD). [17]

In short, the toxicity of RT on the small intestine depends not only on the characteristics of the irradiation (total dose delivered, fractionation, associated chemotherapy). But also on patient-related factors (comorbidities, surgical history, etc.).

Diagnosis :

Acute intestinal toxicityincludes all toxic damage occurringwithinthreemonths of irradiation, with maximum prevalencebetween the 4th and 5th week. [22]

The diagnosis of acute radiation enteritisisdifficult to establish, and isgenerallybased on the appearance of a CT scan in the context of recentexposure [5]. It allows a positive, etiologicaldiagnosis of the site, extent and degree, specifyingany complications (perforation, fistula, abscess or collections) **[6].** Mucosallesions can also lead to clinicallysignificanthaemorrhage [5], occlusive syndrome and intractable pain.

TREATMENT

The management of patients with radiation lesionsis made more complex by the progressive nature and extent of radiation disease and the risk of progression to primary cancer, in addition to considerableundernutrition.

Prevention :

In terms of prevention, the aimis to limit damage to the small intestine in the irradiation field. The dose/volume ratio can beadaptedthanks to advances in RT.

Certain technical tricks have been described to prevent the small intestine fallinginto the pelviccavity, such as omentopexy, or the fixation of the greater omentum to the pelvic border and bladder, posteriorly and anteriorlyrespectively. [12] [14] [17]

The role of medicaltreatment

The therapeuticstrategyisessentiallysymptom-focused, withsupportivetreatmentgenerallydepending on the symptoms.

Nutritional management is a fundamental component of the management of patients with radiation enteritis, rangingfrom simple dietaryadvicecombinedwith correction of deficiencies to parenteralnutritionalsupplementation lasting 4 to 8 weeks in cases of malabsorption and malnutrition. [15]

Probiotics or a residue-free diet are usefulprophylactically to minimizesymptoms, particularlydiarrhea, with or without a transit retardant depending on the picture. Bile acidchelators to bind bile salts and antibiotics in case of microbialproliferation. High-dose sulfasalazine can reduce the symptoms of acute radiation enteritis in established cases, and seems to potentiate the efficacy of parenteral nutrition over 4-8 weeks. [3] [4] [8]

Management of obstruction

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Apart from complications (hemorrhage; perforation; occlusion; abscess; peritonitis) requiringsurgical intervention, medicaltreatmentshouldbepreferred, i.e. placement of a nasogastric tube, adequatehydroelectrolytic support and parenteral nutrition [3], [4], [5] [16] [12].

Surgeryisconsidered a last resort, depending on the mechanism of obstruction [12] [13]. Indicated in cases of persistent mechanical obstruction after initiation of adequatemedicalmeasureswithoutimprovement; in immediatelycomplicatedforms (necrosis; perforation) and in life-threateninghemorrhages [4].

For the choice of surgicalprocedure, thereiscurrently no consensus on the surgicalstrategy for bowelresection or bowel bypass. In the absence of perforation and/or fistula, the indications for resection and shunting are theoreticallyidentical. Nevertheless, the disadvantage of internal bypass, althoughapparentlysimpler and quicker to perform, isthat the diseasedbowelremains in place with a risk of haemorrhage, abscess, perforation and bacterialtranslocation;sometimesitturns out that the origin of the occlusion isotherthanenteritis, so the surgicalprocedureconsists in resolving the problem in itself (e.g. flange, internalhernia) [9] [10] [11] [12] [23].

Conclusion:

Pelvic abdominal RT can induce acute or chronic damage to the wall of the small intestine, known as radiation enteritis. The prevalence of this condition islikely to increase in the future.

The principles of preventionincludereducing radiation doses and narrowingexposurefields.

Therapeutic management of patients with radiation lesionsis made difficult by the multifocal and progressive nature of the lesions, the carcinogenicrisk and the associated malnutrition.

Although the acute formisgenerallylimited, the chronicformisassociatedwithsignificantmorbidity, with a considerable impact on the patient'squality of life. Occlusion is a serious complication of the latter, requiringappropriate management takingintoaccount the risk-benefit ratio, withsurgical indication based on the clinicalpicture and etiology.

As RT continues to expand itsrole in the management of oncologicaldiseases, clinicians must remainalert to the adverse effectsthatresult.

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