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Journal of Gastrointestinal Cancer

ISSN 1941-6628

J Gastrointest Canc
DOI 10.1007/s12029-017-0026-7

Springer

J Gastrointest Canc
https://doi.org/10.1007/s12029-017-0026-7

CASE REPORT

Radiotherapy for Gastric Bleeding from Tumor Invasion of Recurrent Colon Cancer with Liver Metastasis After Resection

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Introduction

Palliative radiotherapy has been reported to be effective for hemostasis [1–3]; however, there is no consensus on the dosage and number of fractions. Lee et al. reported in a retrospective study that a dose higher than the biological effective dose (BED) of 36 Gy was effective for hemostasis of bleeding gastric cancer [1]. Hemostatic radiotherapy is useful for primary gastric cancer. Moreover, we believed that radiotherapy for an invasion from peritoneum to stomach would be useful. Here, we report the case of a patient who had rectal cancer with liver and gastric metastases that responded to palliative, hemostatic radiotherapy.

Case

A 66-year-old man presented to our hospital with malaise and vomiting. He was unaware regarding black stools. He had loose bowels; abnormalities such as constipation, stomach ache, jaundice, and cough were absent. There was no remarkable family or medical history. On laboratory examination, he was noted to have anemia. He underwent chest computed tomography (CT), abdominal CT, upper gastrointestinal barium enema, colorectal barium enema, gastrointestinal tract endoscopy, lower digestive tract endoscopy, and brain magnetic resonance image (MRI). Thorough full body examination revealed sigmoid colon cancer with a 2-cm liver metastasis in segment 3 (Figs. 1 and 2). Thereafter, the patient underwent laparoscopic sigmoidectomy for resection of the primary tumor. Postoperatively, he was administered six cycles of adjuvant chemotherapy with SOX (S-1 at 80 mg/m^2 body surface area and L-OHP at 130 mg/m^2 body surface area) and bevacizumab (BV) at 7.5 mg/kg for 18 weeks. However, there was no decrease in the size of the liver metastasis; therefore, the patient underwent S3 segmental resection of the liver.

He was administered S-1 as a second-line chemotherapy, but there was recurrence from the edge of the partial hepatectomy 26 months after the initial diagnosis (Fig. 3). He was started on IRIS (CPT-11 and S-1 at 80 mg/m^2 body surface area) and BV (CPT-11 at 125 mg/m^{2}body surface area and S-1 at 80 mg/m^2 body surface area), but the tumor size was increased and the patient had onset of obstructive jaundice, for which endoscopic nasobiliary drainage was performed (Fig. 4). At this time, he needed to be hospitalized because the enlarged tumor did not allow him to tolerate oral intake. An indwelling tube was inserted for percutaneous transhepatic biliary drainage (PTCD), which improved the jaundice.

Because he wanted to be able to orally consume food, we performed palliative gastroenterostomy. One week after surgery, he was able to consume rice porridge. However, 1 month later, the PTCD tube became obstructed. He underwent PTCD tube placement; however, he had hematemesis during the procedure. Urgent upper gastrointestinal endoscopy revealed gastric tumor perforation as the source of the bleeding (Fig. 5).

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Published online: 13 November 2017

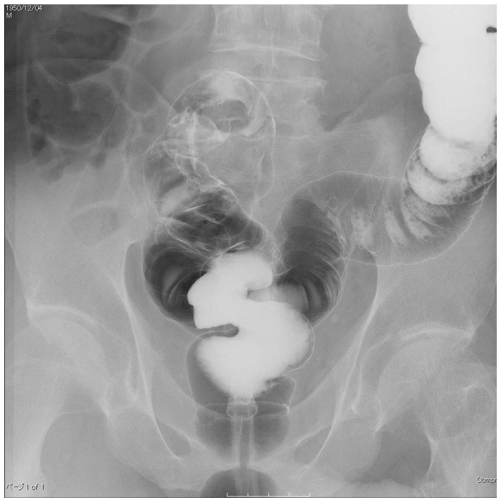

Fig. 1 Colonic enema. An apple core sign in the sigmoid colon, liver metastasis (Dukes classification 4), and local spread were detected

We performed argon plasma coagulation, followed by transfusion of four units of packed RBC because of progression of anemia.

Despite taking the abovementioned measures, there was further progression of anemia; therefore, we decided to subject him to radiotherapy at 20Gy/5fractions, sequentially for 5 days, for the purpose of hemostasis (Fig. 6). After radiotherapy, he complained of moderate pain and fever, which improved in 1 week. Thereafter, we gradually and smoothly progressed his diet. At this time, there was cessation of the worsening anemia. After 14 days, he was transferred to a hospice, where radiotherapy was continued. He could tolerate a dietary intake. However, after 35 days, there was worsening of his condition, and he subsequently died. There was emesma immediately before death; however, there was no admixed blood and melena. When he died, there was no evidence of bleeding from the gastrointestinal organ.

Although we were unable to identify the direct cause of death of this patient, radiotherapy was able to control the worsening anemia, improve gastrointestinal motility and obstruction, and improve his quality of life.

Fig. 2 Contrast-enhanced computed tomography on initial work-up. There is a 2-cm metastasis in segment 3 of the liver

Fig. 3 Contrast-enhanced computed tomography 26 months after the initial diagnosis. There is tumor recurrence from the edge of the partial hepatectomy, with peritoneal dissemination and adhesions to the wall of the stomach

Discussion

In end-stage cancer, bleeding can markedly influence a patient's quality of life; in such cases, radiotherapy can have an important role in the control of bleeding, particularly in the esophagus, stomach, colon, rectum, bladder, and uterus. However, there is no clear evidence on the benefit of palliative radiotherapy.

Lee et al. reported that a dose higher than the BED of 36 Gy was effective for gastric cancer with bleeding [1]. On the other hand, Tey et al. concluded that the overall response rate of radiotherapy for bleeding was 74%. Moreover, there was no difference in the response rates of bleeding between regimens of high BED of ≥ 39 Gy and low BED of < 39 Gy [2]. One study on 15 patients who received external radiotherapy at a median plan of 30 Gy in 10 fractions for bleeding gastric cancer showed that at a median interval of 2 days after initiation of radiotherapy, hemostasis was achieved in 11 patients

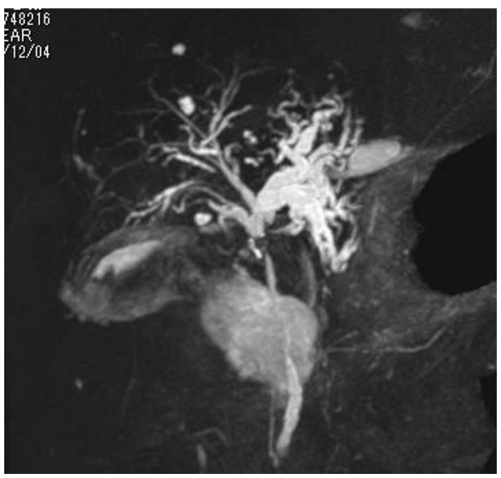

Fig. 4 Magnetic resonance cholangiopancreatography. Cholangiectasis from bile duct stricture due to tumor is demonstrated. There is also prominent enlargement of the left lobe of the liver

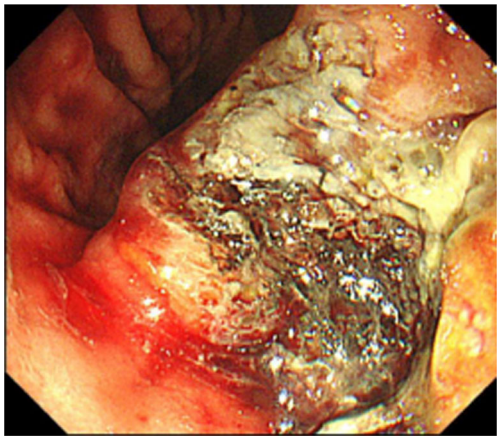

Fig. 5 Upper gastrointestinal endoscopy. A tumor is seen projecting from the outer wall of the stomach. Argon plasma coagulation was attempted to control the bleeding

and rebleeding was observed in 4 patients [4]. Several publications on this topic are available, particularly in Asia [5–12]. Hemostatic radiotherapy was reported to have a response rate of approximately 40–70% and to improve the patients' quality of life. The life expectancy of cancer patients with continuous bleeding is limited. Therefore, administration of treatment that is equally effective in a short period of time is desired. Chaw et al. reported that of 52 patients who received short-course radiotherapy for active bleeding from inoperable gastric cancer, 39 (75%) received one 8-Gy fraction and 13 (25%) received 20 Gy in five daily fractions. On the basis of the response rate of 50% in the 44 patients in whom the need for transfusion was evaluable, they concluded that palliative short-course radiotherapy was reasonable [5].

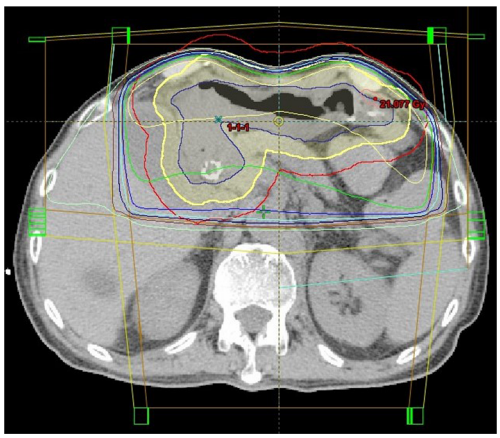

Fig. 6 Radiotherapy computed tomography planning. Butylscopolamine was administered by intramuscular injection to stop the movement of the stomach before breakfast. After 5 min, free-breathing CT scan was performed. The entire stomach was the targeted GTV (blue line), plus 1 cm from the margin for the CTV (yellow line) and another 1 cm from the margin of the CTV for the PTV (red line). The target liver volume for irradiation of more than 18 Gy was limited to below 700 cm^3 in volume irradiated. We set a limit so that 50% of the kidneys received 30 Gy. The green line represents 95% (19 Gy) coverage of the prescribed dose. GTV gross target volume, CTV clinical target volume, PTV planning target volume

Other option of hemostatic therapy for inoperable case is endoscopic therapy, which has been highly successful in achieving hemostasis [12]. A combination of endoscopic therapy modalities, such as injection therapy, mechanical therapy, or ablative therapy, can be used for recent hemorrhage. However, rebleeding after successful hemostasis with endoscopic therapy sometimes occurs. Transarterial embolization or palliative surgery should be considered as well as radiotherapy when endoscopic therapy fails. Cameron et al. reported radiotherapy of the effective palliation of symptomatic incurable rectal cancer. However, there were many methodologies, such as duration or degree of the palliative effect, or potential toxicity [13, 14]. Pereira and Phan summarized the treatment option and concluded that controlled trials are lacking in this patient population. Patients at risk for major hemorrhages should be identified and their families and caregivers should be prepared [15].

At our hospital, there is an ongoing prospective study on short-course radiotherapy with and without salvage radiotherapy. In that study, initial radiotherapy is given at 20 Gy in five daily fractions, followed by additional 15 Gy in five daily fractions if rebleeding is found [11]. In the present case, the same protocol was used. Compared with the treatment of cases with the usual bleeding pattern from gastric cancer, the treatment for this case was different because tumor penetration was from the outside of the stomach. To our best knowledge, there has been no report on radiotherapy for the latter case, in which the wall of the stomach was fragile and short-term radiation could cause tumor lysis syndrome. However, in this patient, short-term irradiation had an immediate and successful effect.

Conclusion

The optimal dose and fractionation regimen of radiotherapy for bleeding gastric cancer remain unclear. Moreover, the management of gastrointestinal bleeding from outer wall penetration (e.g., peritoneal dissemination and organ adhesion) has not been reported well. In the present case with gastric bleeding from outer wall penetration, radiotherapy was effective in immediately improving the patient's quality of life without the need for a bloody procedure.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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