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Pain Palliation Using Hypofractionated Radiotherapy for Unresectable Pancreatic Cancer

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ABSTRACT

Background: Pain is a common symptom for patients with pancreatic cancer and is often treated using palliative radiation therapy. Standard palliative dose regimes typically consist of 2000 cGy to 3000 cGy in 5 to 10 fractions (fx). With the recent advancements in radiation dosimetric planning and delivery, the Juravinski Cancer Centre in Hamilton, Ontario, offers a hypofractionated dose of 2500 cGy in 5 fx for the improvement of pain and tumour control in selected pancreatic cancer patients. This project reviews the safety and efficacy of this prescription.

Methods: A retrospective analysis of 24 patients diagnosed with unresectable pancreatic cancer was conducted. Patient data were collected using in-house medical record systems including MOSAIQ, Meditech, and Centricity. Nonparametric data analysis tests were conducted using Minitab17.

Results: Nineteen of 24 patients (79%) reported a decrease in pain levels following radiation and 13 of 18 (72%) showed good local control of the tumour on a follow-up CT scan. Around 30% of patients reported nausea and vomiting and fatigue. Only 13% reported diarrhea and 8% reported constipation. Twenty-one percent reported pain flares. All patients were able to finish the entire treatment without pauses or delays.

Conclusion: A palliative radiotherapy dose regime of 2500 cGy/5 fx demonstrates a potential for the effective control of pain with limited acute toxicities in patients with unresectable pancreatic cancer. This study aims to indicate the need for further prospective research comparing this regime to other standard treatments in order to determine which is most beneficial for the patient.

RÉSUMÉ

Contexte : La douleur est un symptôme commun chez les patients atteints d'un cancer du pancréas et est souvent traitée par radiothérapie palliative. Les régimes de dose palliative standard sont habituellement de 2000 cGy à 3000 cGy en 5 à 10 fractions (fx). Avec les progrès récents en planification et administration dosimétrique, le Juravinski Cancer Centre de Hamilton en Ontario offre une dose hypofractionnée de 2500 cGy en 5 fx pour l'amélioration du contrôle de la douleur et de la tumeur chez certains patients atteints d'un cancer du pancréas. Ce projet examine la sécurité et l'efficacité de cette prescription.

Méthodologie : Une analyse rétrospective a été effectuée pour 24 patients ayant reçu un diagnostic de cancer non résécable. Les données sur les patients ont été obtenues à partir des systèmes internes de dossiers médicaux, incluant MOSAIQ, Meditech et Centricity. Des tests d'analyse non paramétrique des données ont été effectués à l'aide de Minitab17.

Résultats : Nineteen patients sur 24 (79%) ont signalé une diminution de la douleur après le traitement et 13 patients sur 18 (72%) ont présenté un bon contrôle local de la tumeur selon un examen de TDM de suivi. Environ 30% des patients ont signalé des nausées et des vomissements, ainsi que de la fatigue. Seulement 13% ont signalé de la diarrhée, et 8% de la constipation. Twenty one percent ont signalé des flambées de douleur. Tous les patients ont été en mesure de terminer le traitement sans pauses ou délais.

Conclusion : Un régime de dose palliative de 2500 cGy/5 fx présente un potentiel de contrôle efficace de la douleur avec des toxicités aiguës limitées pour les patients atteints d'un cancer non

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résécable du pancréas. Cette étude vise à indiquer le besoin d'autres études prospectives comparant ce régime à d'autres régimes de traitement standard, de façon à déterminer quel est celui qui est le plus bénéfique pour le patient.

Keywords: Acute toxicity; dose hypofractionation; pain; pancreas; pancreatic carcinoma

Background

Pancreatic cancer is the fourth leading cause of death in cancer patients across Canada and the United States [1,2]. Several factors influence this poor prognosis. Primarily, pancreatic cancer is rapid and diffuse in the nature of its spread. Diagnoses are often only made once the cancer has spread to a significant portion of its surroundings and the cancer is no longer surgically resectable [1]. Surgical unresectability can be attributed to a number of factors, most commonly, venous involvement, encasement of the gastroduodenal artery, or involvement of the celiac axis [3]. Although the cancer is associated with significant morbidities as the disease progresses, early stage cancers often do not exhibit any signs or symptoms. It is therefore estimated that only around 12%–20% of cases are resectable on diagnosis making overall prognosis poor, as surgery is considered the only curative treatment modality [4].

Pain is a common symptom in pancreatic cancer with 40%–80% of patients reporting it as their primary symptom at the time of diagnosis. It arises as a result of the spread of the disease from the pancreas to the nearby celiac axis [4]. Radiation therapy is often used as a palliative modality in the treatment of pain and has proven to be effective in helping patients manage the symptoms of their disease. Currently, the most commonly employed dose regimes include prescriptions of 2000 cGy in 5 fractions (fx), 3000 cGy/10 fx, or 4500 cGy/25 fx [5–7]. Radiation treatment is also often used concurrently with chemotherapy as the primary treatment for patients with locally advanced pancreatic cancer (LAPC). Studies conducted by the Swedish Rectal Trial in 1997 demonstrate a hypofractionated dose regime of 2500 cGy/5 fx to be effective in inducing a response in adenocarcinomas while maintaining acceptable bowel toxicities in preoperative rectal cancer patients [8]. Based on the findings of this rectal trial, which indicated the estimated effect of this dose regime to be similar to that of 4500 cGy/25 fx + 5-fluorouracil (5-FU) chemotherapy (a treatment regime prescribed for both pancreatic and rectal adenocarcinomas), the hypofractionated dose was subsequently applied in the treatment of palliative pancreatic cancer patients. This prescription was first prescribed for treatment of pancreatic adenocarcinomas, at the Juravinski Cancer Centre (JCC) in Hamilton, Ontario, starting in 2010. Currently at the JCC, the prescription of 2500 cGy/5 fx is prescribed to patients to control pain associated with the spread of disease and, in certain cases, attempt to shrink the tumour before surgical resection. However, this regime is not routinely used throughout other cancer centres due to a lack of data regarding its safety and efficacy. This retrospective pilot study was conducted to evaluate the need for further prospective research into the effect of 2500 cGy/5 fx on pain control and tumour progression, in comparison with the standard fractionations of 2000 cGy/5 fx and 4500 cGy/25 fx. Furthermore, some of the potential acute toxicities that arise as a result of treatment were examined and discussed and should serve as data points for analysis in later prospective trials.

Methods

Patients

This study was a retrospective study looking at 24 patients with unresectable pancreatic cancer treated at the JCC. Following ethics approval by the Hamilton Integrated Research Ethics Board, patient lists were obtained using Meditech and physicians' files of all pancreatic cancer patients treated at the JCC from January 2010 to May 2016. Lists were matched to ensure no duplicated patients. Patients were filtered using their patient records on MOSAIQ, the in-house electronic medical record system, based on the radiation treatment they received. Only patients with a radiation prescription of 2500 cGy/5 fx were included in this study. Patients who had undergone surgical resection for their disease before radiation therapy were excluded. This served to eliminate patients with resectable disease as the focus was only on patients with unresectable pancreatic cancer receiving palliative radiation therapy. All the patients were treated in the standard setup for radiation treatment to the abdomen as per JCC protocol. This entails the arms raised above the head on a wingboard, a wedge under the knees, and the possible addition of a standard treatment mattress for patient comfort. No abdominal compression or complex immobilization devices were employed due to the palliative nature of the treatment and poor performance status of the patients.

Data Collection

Patients were anonymized, and data were collected and recorded from MOSAIQ. Demographic data pertaining to the patients' stage and treatment technique were identified and collected. The presence of a decrease in pain level (ie, pain relief) at a median follow-up time of 2 weeks after the end of treatment, presence of disease progression, and whether the patients reported experiencing nausea/vomiting, constipation, diarrhea, fatigue, or pain flares as a result of radiation treatment were collected as yes/no data points. These data points were self-reported and documented during appointments with their radiation oncologists before, during, and at the follow-up appointment after treatment