以電腦斷層爲模擬計畫基礎的乳癌病患放射治療成果報告

Using CT-based Simulation as an Aid for Radiotherapy of Breast Cancer

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摘要

目的：以電腦斷層掃描儀作爲乳癌病患放射治療前之模擬攝影，可增進治療準確度期望能減少肺纖維化。材料與方法：自民國 83 年 7 月至民國 88 年 1 月止，以在本科接受完整放射治療治療並定期追蹤的乳癌病患爲研究對象，共有 95 人，平均年齡爲 49 歲，平均追蹤時間爲 26.74 個月。所有的病人均先以 Alpha Cradle 固定，模擬定位後，接受診斷用的電腦斷層掃瞄，並將影像傳至工作站之電腦，做模擬計畫訂出切線照野部位。確定後，再於模擬定位室依電腦模擬的結果實際模擬一次，並訂出其他治療部位，完成後方開始治療。治療結束後，須定期回診並以胸部 X 光片檢視肺部狀況，以觀察其肺纖維化情形。此外，應用 3-D 電腦治療計畫系統檢視所有病患其切線照野之肺部接受放射治療的狀況，與肺纖維化做比較。結果：經過治療前後胸部 X 光片與放射部位之比對檢視，肺纖維化共有 5 例(526%)，而局部復發者有 3 例(3.16%)。就肺鐵維化的 5 例病患而言，其電腦斷層圖上的最大垂直距離(greatest perpendicular distance, GPD)平均爲 1.75cm。接受切線照野照射的肺部體積平均爲 122.25ml，而其接受照射的肺部體積佔同側肺體積之百分比平均爲 7%,3 例局部復發病患其 GPD 平均爲 1.5cm；接受切線照野照射的肺部體積平均爲 155.48ml；而其照射的肺體積佔同側肺體積之百分比平均爲 6.12%。結論：以電腦斷層爲模擬計畫基礎的乳癌病患放射治療可以增加治療計畫的準確度。它比傳統治療更精確的原因在於能精確地掌握解剖學上的位置，如脊髓，心臟，淋巴結，及原發腫瘤位置，所以更能掌握要治療的部位及要保護的組織。我們希望藉此可以安全地給予較高劑量，以提昇局部控制率，及減少肺部照射以降低肺纖維化的發生。

Abstract

Purpose: Using CT-based simulation as an aid for breast cancer radiotherapy to increase the accuracy of treatment and hope to decrease the rate of lung fibrosis. Materials and Methods: From July 1994 to January 1999, we retrospectively analyzed 95 patients who received full course radiotherapy with regular follow-up at our department. The average age of the patients was 49 years old, and the median follow-up interval was 26.7 months. A method was devised to simulate patients with breast cancer in the actual treatment position

by using a diagnostic CT spiral scanner and a workstation for virtual simulation. It was desired to produce non-divergent tangential beams through the lung at the matching line for tangential and supraclavicular fields. Bach patient was immobilized in an Alpha Cradle cast. Radio-opaque markers were placed on the margins of the fields decided by simulation and CT scan was performed. The data set was transferred to the workstation. After reconstruction of all the images, we performed virtual simulation from computer. When treatment parameters were decided, we would resimulate patient before treatment started. Patients received regular follow-up after completion of radiotherapy. Chest X-ray films were taken to detect lung metastasis and fibrosis while physical examination and chest CT were performed to evaluate local recurrence. Results: All the chest X-ray films were rechecked and 5 patients (5.26%) with lung fibrosis were noted. According to the chart records and CT images, local recurrence was noted in 3 patients (3.16%). Among the 5 patients with lung fibrosis, the average greatest perpendicular distance (GPD) measured from the CT image was 1.75cm, the average irradiated lung volume of the tangential fields was 122.25 mlthat occupied 7% of the ipsilateral lung volume. For the 3 patients with local recurrence, the average GPD was 1.5cm, the average irradiated lung volume within the tangential fields was 155.48 ml, and the average irradiated lung volume was 6.12% of the ipsilateral lung. Conclusion: Using CT-based simulation as an aid for breast cancer radiation treatment was more accurate than traditional treatment planning. It provided us the accurate relationship between the position of the target and critical organs. We decrease irradiated lung volume and hope to reduce the chance of lung fibrosis.