PROGNOSTIC BIOMARKERS FOR CHEMOTHERAPY RESPONSE ON HPE IN OSTEOSARCOMA PATIENTS

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AJCC	American Joint Committee on Cancer
CI	Confidence Interval
EOI	European Osteosarcoma Intergroup
HU	Hounsfield Unit
HUSM	Hospital Universiti Sains Malaysia
ITK	Insight Segmentation and Registration Toolkit
MRI	Magnetic Resonance Imaging
PACS	Picture Archiving and Communication System
ROI	Region of Interest
TV	Tumour Volume
TNV	Tumour Necrotic Volume
WHO	World Health Organization
WI	Weighted Images (on MRI)

ABSTRAK

Latar belakang: Osteosarcoma adalah antara barah yang paling ganas berasal dari sel mesenkim yang membentuk tulang primitif. Kajian ini adalah bertujuan untuk mencari saling kait antara penemuan klinikal, corak pertumbuhan tumor, jumlah tumor, metastasis ke paru-paru, dan nekrosis tumor dengan tindak balas kemoterapi pada HPE untuk pesakit osteosarcoma setelah menerima rawatan kemoterapi neoadjuvant. Faktor-faktor prognostik ini dapat membantu dalam melaksanakan pengurusan risiko-risiko pesakit osteosarcoma.

Metodologi: Ini adalah kajian kohort retrospektif terhadap semua pesakit yang telah dirawat antara Januari 2000 dan Disember 2020. Imej MR pesakit osteosarcoma telah di ambil dari 'PACS' dan data pesakit dianalisis untuk pemboleh ubah kajian seperti yang telah dijelaskan sebelumnya. Pesakit akan dibahagikan kepada tiga kumpulan berdasarkan corak pertumbuhan barah seperti konsentrik, eksentrik dan membujur. Isipadu barah dan barah nekrosis dinilai menggunakan aplikasi perisian separa automatik. Hubung kait antara corak pertumbuhan barah, isipadu dan penemuan klinikal dengan pemboleh ubah HPE telah dianalisis.

Keputusan: Kami telah mengkaji seramai 18 pesakit di antara usia 6– 48 tahun (medan = 20). Secara keseluruhannya, 5 pesakit telah menunjukkan tindak balas yang baik terhadap kemoterapi. Metastasis ke paru-paru dan patah disebabkan patologi telah ditemui pada 7 pesakit. Dalam kajian kami, barah nekrosis yang mempunyai isipadu yang kecil sebelum kemoterapi, keputusan pengimejan MR telah menunjukkan tindak balas yang sangat baik dari segi nekrosis HPE. Daripada kajian ini telah menunjukkan terdapat hubung kait yang sangat ketara antara tindak balas kemoterapi dan pemboleh ubah lain seperti umur pesakit, jantina, subjenis, terdapat metastasis ke paru-paru dan isipadu barah.

Kesimpulan: Secara keseluruhannya, hasil kajian ini menunjukkan bahawa corak pertumbuhan, isipadu barah dan penemuan klinikal seperti kehadiran metastasis ke paru-paru pada pengimejan tidak berkait rapat dengan hasil nekrosis HPE. Walau bagaimana pun, terdapat bukti mengatakan bahawa pesakit yang mempunyai kuantiti

nekrotik barah yang kecil sebelum kemoterapi akan menunjukkan tindak balas kemoterapi yang baik. Selain itu, ketiadaan patah tulang patologi juga menunjukkan tindak balas yang baik pada kemoterapi.

Kata kunci: Osteosarcoma, MRI, barah tulang, kemoterapi neoadjuvant, corak ketumbuhan, kelangsungan hidup.

ABSTRACT

Background: Osteosarcoma is the most common primary malignant tumour derived from primitive bone-forming mesenchymal tissue. The study aims to find any association between clinical findings, tumour growth patterns, tumour volume, pulmonary metastasis, and tumour necrosis with chemotherapy response on HPE in osteosarcoma patients following neoadjuvant chemotherapy which in tern correlates with the patient survival. These prognostic factors may help in the application of risk adaptive management of osteosarcoma patients.

Methodology: This is a retrospective cohort study of all patients treated between January 2000 and December 2020. MR images of patients with osteosarcoma were taken from PACS and data analysed for the study variables as described. Patients were divided into three groups based on the tumour growth pattern, namely concentric, eccentric, and longitudinal groups. Tumour volume and tumour necrotic volumes were calculated using reliable semi-automated software. Correlations between tumour growth patterns, volumes and clinical features with histopathological variables were analysed.

Results: We included 18 patients with an age range of 6–48 years (median = 20). In total, 5 patients had a good chemotherapy response. Lung metastasis and pathological fractures were found in 7 patients. In our study, a smaller necrotic volume calculated on pre-chemotherapy MRI showed a significant response to chemotherapy in terms of histological necrosis. There was a significant correlation found in the chemotherapy response for variables like pathological fractures and location of the tumour. However, there was no significant correlation found between chemotherapy response and the other variables like age, gender, subtype, presence of lung metastasis, growth pattern and tumour volume.

Conclusion: Overall, the study suggests that growth patterns, tumour volume and clinical features like the presence of pulmonary metastasis in imaging were not associated with the HPE necrosis outcome. However, there is evidence to suggest that patients with a comparatively smaller pre-chemotherapy tumour necrotic volume

showed a good chemotherapy response. Also, the absence of pathological fracture showed a good chemotherapy response.

Keywords: *osteosarcoma, MRI, bone tumours, neoadjuvant chemotherapy, growth patterns, survival*