Formulasi dan Uji Reliabilitas Sistem Skoring untuk Mendiagnosis Osteosarkoma = Formulation and Reliability Study of Scoring System to Diagnose Osteosarcoma

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Abstrak

Latar Belakang: Osteosarkoma merupakan keganasan tulang primer dengan beragam subtipe dan memerlukan pendekatan multidisiplin dalam diagnosis dan tatalaksananya. Hingga saat ini belum ada alat diagnostik yang terbukti dapat mendekati clinicopathological conference (CPC) sebagai standar baku emas. Keterbatasan fasilitas, biaya, dan antrian pemeriksaan yang panjang sering kali menunda diagnosis osteosarkoma. Penelitian ini bertujuan untuk membuat model sistem skoring berdasarkan temuan klinis, laboratorium, radiografi konvensional, dan histopatologis untuk mendiagnosis osteosarkoma secara cepat dan tepat.
Metode: Penelitian ini dilakukan dalam dua tahap. Tahap pertama bertujuan untuk memformulasikan sistem skoring untuk mendiagnosis osteosarkoma menggunakan data sekunder secara retrospektif di RS. Dr. Cipto Mangunkusumo tahun 2016 hingga 2020. Studi ini melibatkan semua pasien dengan suspek keganasan tulang primer dan didiagnosis akhir berdasarkan CPC. Uji analisis dilakukan secara univariat, bivariat, dan multivariat menggunakan regresi logistik backward stepwise dilanjutkan dengan uji kalibrasi dan diskriminasi menggunakan uji Hosmer-Lemeshow dan kurva receiving operator characteristic (ROC), serta menentukan titik potong pada model. Tahap kedua ditujukan untuk mengevaluasi model sistem skoring yang diformulasi pada tahap pertama secara prospektif menggunakan data primer sejak September 2022 hingga Desember 2022 di poliklinik Orthopaedi dan Traumatologi RS. Dr. Cipto Mangunkusumo.
Hasil: Penelitian tahap pertama melibatkan 120 subjek dan menghasilkan dua model sistem skoring, yaitu dengan mempertimbangkan riwayat pijat (model 1) dan tanpa mempertimbangkan riwayat pijat (model 2). Dari hasil analisis multivariat, didapatkan sembilan variabel yang dimasukan dalam model sistem skoring yaitu usia, indeks massa tubuh (IMT), onset, riwayat pijat, lokasi tumor, kadar alkaline phosphatase (ALP), laktat dehidrogenase (LDH), letak lesi berdasarkan radiografi konvensional, serta gambaran histopatologis berdasarkan fine needle aspiration biopsy (FNAB). Uji kalibrasi model 1 dan 2 menunjukan kalibrasi yang baik (p=0,498 dan p=0,917). Uji diskriminasi pada model sistem skoring menunjukan nilai area under the curve (AUC) 0,818 dengan nilai p<0,001 pada model 1 dan 2. Titik potong pada model 1 dan 2 berturut-turut adalah 19 dan 11 poin. Penelitian tahap kedua melibatkan 34 subjek dan menunjukan sensitivitas, spesifisitas, dan akurasi model 1 dan 2 berturut turut sebesar 81,25% dan 87,5%, 100% dan 100%, dan 91,1% dan 94,1%.
Kesimpulan: Didapatkan dua model sistem skoring yang mampu mendiagnosis osteosarkoma dengan cepat dan tepat dibandingkan dengan CPC. Lokasi tumor di lutut

dan gambaran sel pleiomorfik dengan atau tanpa matriks osteoid ganas merupakan faktor yang paling berpengaruh terhadap diagnosis osteosarkoma.
.....Introduction : Osteosarcoma, being one of the most prevalent among the primary bone malignancies, consists of multiple subtypes and requires a multidisciplinary approach for proper diagnosis and treatment. Lately, there have not been a diagnostic tool that is able to rival the accuracy of clinicopathological conference (CPC) as a gold standard in determining the diagnosis and treatment of osteosarcoma. Limitations in budgeting, as well as the time taken for each patient to undergo supporting examinations often leads to a delayed diagnosis. This research aims to create a scoring system that is based on clinical symptoms, laboratory results, conventional radiology, as well as histopathological results to establish a quick and accurate diagnosis for osteosarcoma.
Method: This research was conducted in two stages; the first stage aims to formulate the scoring system for diagnosing osteosarcoma by using a retrospective, secondary data obtained from Dr. Cipto Mangunkusumo Hospital from 2016 up to 2020. This study involved all patients with suspected bone malignancies that was eventually diagnosed with osteosarcoma by means of CPC. The analysis was done with univariate, bivariate, and multivariate analysis using backward stepwise logistic regression method followed by calibration and discrimination test using Hosmer-Lemeshow test and receiving operator characteristic (ROC) curve analysis, and determined the cut-off point in the scoring system model. The second stage was aimed to prospectively evaluate the previously formulated scoring system model in the first stage using primary data from September 2022 to December 2022 at Orthopaedic and Traumatology outpatient clinic Dr. Cipto Mangunkusumo Hospital.
Result: The first stage of the study involved 120 subjects and resulted two models of scoring system, namely by considering massage history (model 1) and without considering massage history (model 2). From multivariate analysis, nine variables were included in the scoring system model, including age, body mass index (BMI), onset, massage history, tumor location, alkaline phosphatase (ALP) levels, lactate dehydrogenase (LDH), location of the lesion based on conventional radiography, and histopathological finding based on fine needle aspiration biopsy (FNAB). Calibration tests for models 1 and 2 showed good calibration ($p=0.498$ and $p=0.917$). The discrimination test on the scoring system model showed an area under the curve (AUC) value of 0.818 with a p-value <0.001 in both models 1 and 2. The cut-off points in model 1 and 2 were 19 and 11, respectively. The second stage of the study involved 34 subjects with the sensitivity, specificity, and accuracy of models 1 and 2 showing 81.25% and 87.5%, 100% and 100%, and 91.1% and 94.1%, respectively.
Conclusion: This study has proposed two models of scoring systems that can be used for a more rapid and accurate diagnosis of osteosarcoma when compared to CPC; the location of the tumor mass in the knee joint and the appearance of pleomorphic cells, with or without the appearance of malignant osteoids, both being significant factors in diagnosing osteosarcoma