

# **Glenoid and humerus bone analysis using CT transverse sections to automate gleno-humeral joint diagnoses and surgery managements**

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摘要

## **Abstract**

This paper describes an image analysis method that evaluates the glenoid and humerus bone morphology to automate the gleno-humeral (GH) joint diagnoses and surgical managements. This method uses radial B-spline curves to approximate ellipse-like shoulder structures including the humeral stem, tubercle and contact joint as well as the glenoid on every CT transverse section. Radius changes from structure centers to bone boundaries are recognized as convex, concave, separate and hole features that are then identified as pathological spurs, fractures and tumors. The centers and radii of these structures from the transverse sections are integrated to determine the properties of the humeral stem and contact joint with the glenoid, including the stem axis as well as the contact joint and glenoid centers, radii and attitudes. Based on the geometric evaluations of these structures and features, the GH joint surgery including tumor dissect and bone graft, open reduction using screws and plate or nails, and arthroplasty are automatically managed to achieve the normal GH joint functions including dissection of tumors, reduction of fractures or dislocations, and free GH joint motions. This prototype system can be used as a qualitative and quantitative tool for the GH joint diseases diagnoses and surgery managements. A series of examples and case studies illustrate the effectiveness of this automated method.