BOOK REVIEW

"THE ROLE OF MATHEMATICS ON HUMAN STRUCTURE"

Author: Swapan Kumar Adhikari
Publisher: Depali Publication, West Bengal, India
Published in 2003
Paperback, pages vii + 156
Retail price: US$10.95
ISBN: 81-901643-0-9

The recognition of form and their function in human structures, organs or systems based on mathematics has always been intriguing. Perhaps it is because each answer to a question opens another door to a room of more unanswered questions. Mathematics can provide logic and strategy in relating the form, shape and orientation of a structure to their function. Mathematics, of course, works within limits, assumptions and guidelines, yet often provides proof to the pudding.

This book gives anecdotal mathematical derivatives and examples relating the form of various structures and organs, to their function. The book begins with how the author has been inspired by two great minds – Leonardo Da Vinci and Rene Descartes – who have applied and developed mathematical theories, models and rules to structural anatomy of the musculoskeletal system (Chapter 1) and physiological concepts related to fluid flow (Chapters 2 and 3), respectively.

The chapters on the musculoskeletal system applies analytical geometry and calculus in understanding the complex shapes of the joints and how this relates to the range of motion and kinematics of the moving segment. For example, Chapter 7 relates the 3-D profile of the humeral head and its congruity in the glenoid to the efficiency of the kinematics about the shoulder joint. A similar analysis is done for the hip joint (Chapter 12). The geometric design of the vertebrate and the distribution of the trabecular bones within, and how this is related to the efficiency of the load transfer with the cortical shell, was also put forward (Chapters 6 and 8).

The book appears to appeal to a student of mathematics with an interest in special geometric designs, kinematics and kinetics. In this case, the author, a lecturer in Mathematics, put across analyses of various anatomical structures, where it is probably expected that the reader has an intermediate level of calculus and analytical geometry, otherwise reading the later chapters does become a challenge, yet an interesting one at that. This is the rather disappointing part of the book, as it does become difficult for a clinician or surgeon to follow. However, it could provide a decent experience and understanding on how some anatomical forms, shapes and orientation can be described by mathematical analysis and logic, and then relating it to their function. It might not be directly used to solve a surgically-related problem, but it will certainly provide useful thinking and understanding to the surgeon on the "hows?" and "whys?" of various anatomical geometries and their related functions.

Overall, the book might appeal to a student in mathematics and might provide a decent introduction to medical researchers, who are working on mathematically modelling various geometries and orientations, and relating them to their function in both health and disease.

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