Chapter 3
Clinical Management of Intracranial Aneurysms:
Enhancing Diagnostic Accuracy and Surgical Precision

Amanullah Khan
https://orcid.org/0000-0003-1808-5084
Liaquat National Hospital, Pakistan

Salman Shareef
Liaquat National Hospital, Pakistan

Mehak Hafiz
Liaquat National Hospital, Pakistan

ABSTRACT

Managing intracranial aneurysms is a tightrope balancing act for any neurosurgeon, especially in low- and middle- income countries where lack of resources threatens an optimal care. A retrospective study was carried out to observe how a CT-based anatomical mapping system influenced the diagnostic accuracy and surgical precision in managing cerebral aneurysms at a tertiary care center in Karachi, Pakistan. Analyzing data from 82 patients showed a female preponderance (65.9%) and a high incidence of hypertension in relation to risk factors (82.9%). All patients presented with acute hemorrhage and headache. CT localized the aneurysms with precision and yielded statistically significant correlations between GCS and aneurysm sites (p = 0.029) and between types of seizures and aneurysm locations (p = 0.003). Cerebral infarction highly correlated with decompressive surgery (p < 0.001). These findings further elaborate how the state-of-the-art CT-based anatomical mapping allows for early diagnosis, risk stratification, and targeted surgical intervention.

DOI: 10.4018/979-8-3373-2807-2.ch003

Copyright © 2026, IGI Global Scientific Publishing. Copying or distributing in print or electronic forms without written permission of IGI Global Scientific Publishing is prohibited.

1. INTRODUCTION

The clinical management of intracranial aneurysms goes a long way in innovative approach changes as to what has happened in recent times with diagnostic imaging and minimally invasive surgery. Treatment of ruptured intracranial aneurysms still makes it an important neurosurgical emergency as, without treatment, mortality ranges up to 50 percent (Deshmukh *et. al,* 2024). The modernization of protocols emphasizes rapid collaboration between neurosurgeons, neuroradiologists, and neurocritical care teams for maximum benefit to patients, especially when dealing with aneurysms within that critical 72-hour window for vasospasm prevention (Trakolis *et.al*, 2024).

Endovascular methods have come to the fore as mainstream procedures in case of ruptured aneurysms, with randomized study evidence showing that these methods are safer than clipping. Complexities can only be cured through open surgery in the advanced case, where 3D rotational angiography is additionally used for intraoperative guidance. Flow-diverting stents and intrasaccular devices allow for target reconstruction of the vessels involved in the aneurysm. It is the emphasis of the ARISE I Consensus that centralized care is given in high-volume centers where multidisciplinary teams partakes in integrated microsurgical-endovascular experience for more optimum outcomes (Tjoumakaris *et.al*, 2024).

These advancements underline the better combination of AI diagnostic systems with advanced imaging protocols and personalized surgical strategies to hemispheric aspects in intracranial aneurysms. Further studies continue through national radiographic registries and optical coherence tomography in higher refinement towards rupture risk stratification and the choice of treatment methods (Adamchic, 2025).

Figure 1. Brain Aneurysm

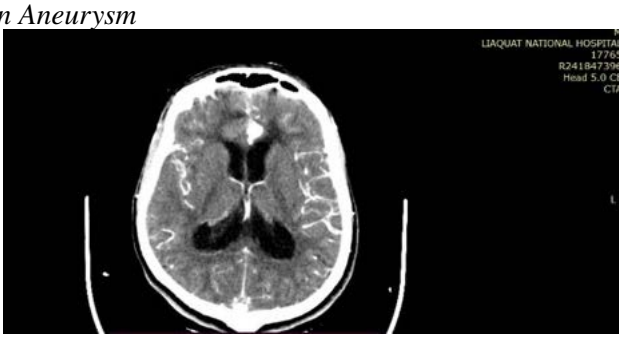

Figure 1 shows the axial section of an enhanced CT Angiography scan of the brain performed at Liaquat National Hospital. The ordinary CT study provides cross-sectional images of the brain vasculature and ventricle as applied to determine

16 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/clinical-management-of-intracranial-aneurysms/389651

Related Content

Emerging Technology Adoption and Applications for Modern Society Towards Providing Smart Banking Solutions

K. R. Pundareeka Vittala, Sayed Sayeed Ahmad, R. Seranmadeviand Amit Kumar Tyagi (2024). *Enhancing Medical Imaging with Emerging Technologies (pp. 315-329).*
www.irma-international.org/chapter/emerging-technology-adoption-and-applications-for-modern-society-towards-providing-smart-banking-solutions/344676

Deep Convolutional Neural Network-Based Analysis for Breast Cancer Histology Images

E. Sudheer Kumar, C. Shoba Binduand Sirivella Madhu (2023). *Research Anthology on Improving Medical Imaging Techniques for Analysis and Intervention (pp. 1267-1285).*
www.irma-international.org/chapter/deep-convolutional-neural-network-based-analysis-for-breast-cancer-histology-images/315103

Multi-Stream Attention-Based Convolutional Neural Network for Medical Imaging

T. V. V. Satyanarayana, B. Bhaskar Reddy, A. Swetha Rani, P. Sree Lakshmiand Hedayath Basha Shaik (2025). *Deep Learning in Medical Signal and Image Processing (pp. 461-486).*
www.irma-international.org/chapter/multi-stream-attention-based-convolutional-neural-network-for-medical-imaging/381165

Detection and Segmentation of Medical Images Using Generic Algorithms

Hardev Mukeshbhai Khandhar, Chintan M. Bhattand Simon Fong (2023). *Research Anthology on Improving Medical Imaging Techniques for Analysis and Intervention (pp. 1563-1570).*
www.irma-international.org/chapter/detection-and-segmentation-of-medical-images-using-generic-algorithms/315118

Advancing Medical Diagnostics on Computer-Assisted Analysis for Digital Medicinal Imagery

Ashwini Kumar, Vishu Tyagi, Harikesh Singhand Sourabh Jain (2025). *Computer-Assisted Analysis for Digital Medicinal Imagery (pp. 393-408).*
www.irma-international.org/chapter/advancing-medical-diagnostics-on-computer-assisted-analysis-for-digital-medicinal-imagery/361032