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Diagnostic Value of Computed Tomography in Disc-Root Conflicts: Experience from Pasteur Polyclinic of Bamako and CNOS University Hospital

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Abstract

This prospective descriptive study, conducted from August 2023 to August 2024, evaluated the contribution of Computed Tomography (CT) in diagnosing disc-root conflicts in two major radiology centers in Bamako, Mali: the Pasteur Polyclinic and the CNOS University Hospital. A total of 172 patients were examined, with CT abnormalities detected in 112 cases (65%). The average patient age was 49 years, and males predominated (sex ratio 1.29). Lumbar sciatica was the most frequent reason for consultation (41.1%), followed by chronic low back pain (23.2%) and cervicobrachial neuralgia (9%). CT findings revealed vertebral abnormalities in 58% of patients, mainly osteophytes of the vertebral bodies (29.5%) and vertebral compression (11.6%). Disc pathology was dominated by disc protrusion (55.4%) and bulging (22.9%), with a predominance of lumbosacral involvement (67.8%). Disc-radicular conflicts represented 52.7% of cases, most often at the foraminal site (37.8%). The spinal canal was narrowed in 40% of patients, particularly in those over 55 years. Although MRI remains the reference imaging technique for exploring radiculopathies, CT scanning proved highly valuable in our context, where MRI availability is limited. CT provided a reliable morphological assessment of degen-

erative, compressive, and bony changes responsible for painful radiculopathies. It remains a practical and essential diagnostic tool for spinal evaluation in resource-limited settings.

Keywords

Computed Tomography, Disc-Root Conflict, Sciatica, Lumbar Spine, Mali

1. Introduction

Disc-radicular conflict refers to all symptoms secondary to compression of the nerve roots by an intervertebral disc that has protruded from its normal position. This protrusion, also known as a disc herniation, is a common condition [1] [2]. The hospital frequency of impingement is estimated at 24.6% [3] and is the second most common reason for consultation in neurology departments after headaches [4].

Disc-root impingement is more prevalent in men, with a sex ratio of 1.9 and an average age of 48.8 years [5].

Investigate hormonal influences on gender differences in disc-root impingement Compare incidence rates of disc-root impingement by age groups under 50 Analyze occupation-related risk factors contributing to higher male prevalence Identify differences in symptom presentation between men and women Assess long-term outcomes of disc-root impingement treatments by gender Nowadays, the diagnostic investigation of disc-radicular conflicts has become easier thanks to cross-sectional imaging techniques, in particular Computed Tomography (CT) and Magnetic Resonance Imaging (MRI).

Computed tomography, due to its availability, its sensitivity in accurately visualising bone structures, its diagnostic effectiveness in degenerative spinal pathologies and its usefulness in guided therapeutic infiltrations, remains a valuable diagnostic tool in the investigation of disc-root conflicts [6].

MRI, with its rich contrast, is the cornerstone of spinal investigation and allows for optimal examination of the disc, spinal cord, meninges, and roots.

Imaging plays a crucial role in establishing a definitive diagnosis, assessing the severity of compression, and determining treatment options.

At the Pasteur Polyclinic and the CNOS University Hospital, we have observed that disc-radicular conflicts are becoming increasingly common and mainly affect people aged 55 and over. Computed tomography plays a key role in the multidisciplinary management of this neurological condition. Based on these findings and the importance of computed tomography, we set ourselves the goal of studying the various CT aspects of disc-radicular conflicts.

2. Materials and Methods

Over a 12-month period, from August 2023 to August 2024, we conducted a prospective descriptive study involving 172 patients who met our predefined inclu-

sion criteria. The study analyzed CT scan requests related to disc-radicular conflicts routinely referred to our department. Descriptive statistics (frequencies and percentages) were calculated for all variables.

The study included all patients who underwent thoracolumbar and/or cervical CT scans showing imaging signs of disc-radicular conflict and who consented to participate. Patients with incomplete or unusable clinical, imaging, or personal data were excluded. Data were collected using a standardized survey form serving as an individual medical record. Information was extracted from radiologists' reports, imaging request forms, and patient files.

All examinations were performed on two scanners: a General Electric Revolution ACT 16 LightSpeed helical CT scanner and a Philips 16-slice CT scanner, both with a gantry rotation time of 0.5 seconds. Each system was capable of acquiring 16 slices per rotation, with collimation pitches of 16 × 0.63 mm and 16 × 1.25 mm, respectively.

Scanning followed our institutional spinal CT protocol, which acquires non-contrast volumetric data of the cervical and/or thoracolumbar-sacral spine. Intravenous contrast was administered only when clinically indicated (e.g., suspected tumor or abscess).

The variables studied included patient age, sex, reason for consultation, clinical signs, spinal statics, vertebral and disc abnormalities, type of disc protrusion (focal extension with intact external annulus or wide-based herniation), type and location of nerve impingement, morphological appearance of the nerve root and spinal canal, and the spinal level involved.

On CT evaluation, a free disc fragment was defined as a hypodense area within the herniated mass, often representing migrated disc material located over 6 cm from the disc center. Radio-anatomical types were categorized as subligamentous or extraligamentous and assessed for associated features such as spinal canal stenosis, osteoarthritis, or trauma. The location of the conflict was classified as cervical, thoracic, or lumbosacral, and the disc protrusion was described as medial, paramedial, lateral, or foraminal. Protrusions continuous with the posterior disc edge appeared as isodense or hypodense relative to the disc, whereas osteophytic or uncarthrotic protrusions appeared hyperdense.

Direct imaging signs included epidural space obliteration, dural sac compression, nerve root amputation, displacement of retrocorporal venous plexuses, and foraminal venous stasis. Signs of potential ligament damage included irregular or lobulated posterior herniation margins with an acute connection angle, a hernial anteroposterior diameter at least half that of the dural sac, and marked cranio-caudal migration of the herniated material. Disc herniations were described according to their location, volume, migration extent, and surrounding osseous changes.

Data were entered and initially processed using Microsoft Word 2016, then analyzed statistically with SPSS version 21. Patient confidentiality was strictly maintained throughout data collection and analysis. All datasets were anonymized and securely stored to ensure the protection of participant identity and prevent unau-

thorized access.

3. Results

A total of 172 patients were recruited, and CT scans revealed abnormalities in 112 patients, including 91 patients in the imaging and radiology department of the National Centre for Odontostomatology Hospital. The average age of the patients was 49, with extremes ranging from 65 to 70. Males were the most represented gender, with a sex ratio of 1.29. Lumbar sciatica was the most common reason for consultation, accounting for 41.1% of cases, sometimes associated with neurological disorders such as paralysis or paraesthesia and genito-sphincter disorders such as acute urinary retention, urinary or faecal incontinence. Cervicobrachial neuralgia accounted for 9% of the reasons for consultation, with a predominance of intercostal pain.

Sonnette's sign was the most common physical sign, accounting for 33% of cases, followed by segmental spinal stiffness, accounting for 23.2%.

Segmental spinal straightness was the most common static disorder, accounting for 47.3%, scoliosis was noted in 9.8% of cases and spondylolisthesis in 8.9% of cases. Vertebral abnormalities were noted in 58% of patients, predominantly osteophytosis of the vertebral bodies (29.5%) (**Figure 1**), followed by vertebral compression (11.6%) and bone demineralisation (8.9%). Isolated disc protrusion (focal extension with intact external annulus, base wider than the herniation) (**Figures 2-4**) was the most common disc abnormality, occurring in 39.3% of cases. Protrusion was associated with disc narrowing in 33% of cases and disc void in 25% of cases. Disc protrusion was the most common type of protrusion, accounting for 56.9% of cases (**Figures 3-4**), followed by disc bulging (Symmetrical extension of the disc beyond the vertebral boundaries without rupture of the annulus), accounting for 22.9% of cases, and disc extrusion (disc material beyond the base of the annulus, usually with annular rupture), accounting for 16.5% of cases.

Disc-radicular conflict accounted for 52.7% of conflicts, disc-dural conflict accounted for 27.7%, and osteo-disc-radicular conflict accounted for 19.6% (Tables 1-3). Radicular conflict was foraminal in 37.8% of cases, extraforaminal in 32% of cases, and intracanalicular in 30% of cases. The nerve root was swollen and surrounded by a protruding disc mass in 54.5% of cases and embedded in 11.6% of cases. The canal was narrow in 40% of cases and narrowed in 31.2%. Canal narrowness was the most common canal abnormality, accounting for 40% of cases. The lumbosacral spine was the most common site of conflict, accounting for 67.8%, followed by the thoracic spine and cervical spine, with respective frequencies of 8.9% and 23.2%.

Table 1. Distribution of patients according to reason for consultation.

Reason for consultation	Number of employees	Percentage *%*
Lumbosciatica	**46**	**41.1**

Continued

Acute low back pain	24	21.4
Chronic low back pain	26	23.2
Lumbocruralgia	3	2.6
NCB*	10	9.0
Trauma	3	2.6
Total	**112**	**100.0**

NCB*: Cervicobrachial neuralgia. Lumbosciatica was the most common reason for consultation (41.1%).

Table 2. Distribution of patients according to spinal abnormalities.

Spinal abnormality	Number of individuals	Percentage %
Vertebral body osteophytes	**33**	**29.5**
Compression	13	11.6
Fracture	3	2.7
Transitional abnormality	6	5.4
Bone demineralization	10	8.9
None	47	42.0
Total	**112**	**100.0**

Osteophytes of the vertebral bodies were the most common spinal abnormalities, accounting for 29.5% of cases. Spinal abnormalities were noted in 58% of patients.

Table 3. Distribution of patients according to the type of conflict.

Type of conflict	Number of employees	Percentage %
Disc-dural conflict	31	27.7
Disc-radicular conflict	**59**	**52.7**
Osteo-disc-radicular conflict	22	19.6
Total	**112**	**100.0**

Disc-radicular conflicts accounted for 52.7% of conflicts.

Table 4. Distribution of patients according to the location of radicular conflicts.

Location of conflict	Number of personnel	Percentage %
Canalaire	34	30
Foraminale	**42**	**37.8**
Extra-foraminale	36	32
Total	**112**	**100.0**

The root conflict was foraminal in most cases, *i.e.*, 37.8%.

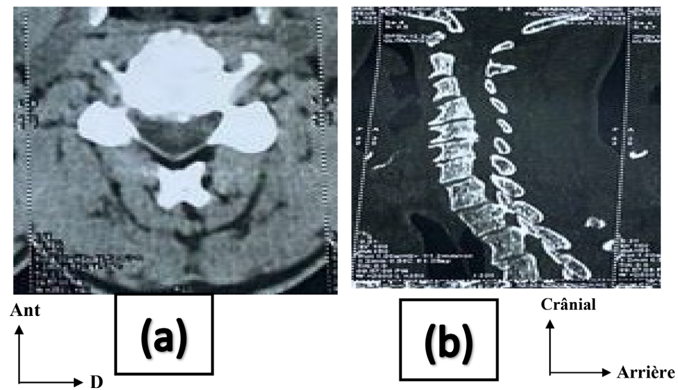

Figure 1. 64-year-old patient, cervical spine CT scan in parenchymal window with axial reconstruction passing through the C5-C6 disc showing a disco-osteophytic protrusion (arrow) coming into contact with the dural sheath, conflicting with the nerve root (black star) on the left (a). CT scan of the cervical spine in bone window with sagittal reconstruction showing stepped osteophytes of the vertebral bodies (b).

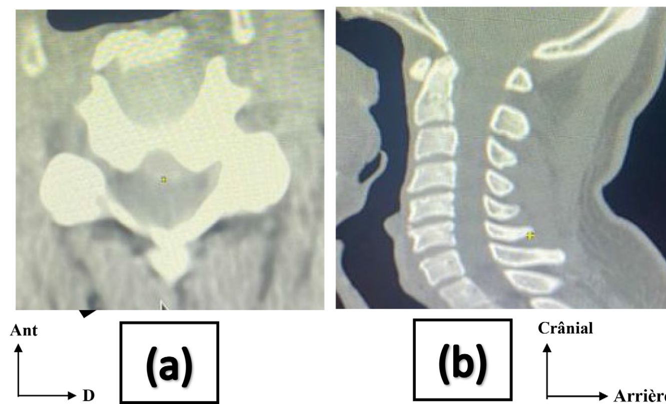

Figure 2. 56-year-old patient, cervical spine CT scan in parenchymal window with axial reconstruction passing through the C6-C7 disc showing a posteromedial disc herniation (arrow) coming into contact with the dural sheath (black star) in (a). CT scan of the cervical spine in bone window with sagittal reconstruction showing straightness of the cervical spine in (b).

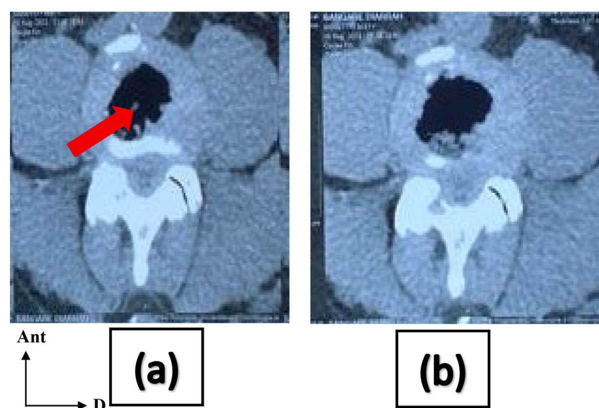

Figure 3. 70-year-old patient, lumbar spine CT scan in parenchymal window with axial reconstruction passing through the L3-L4 disc, showing (a) a disc void (red star) in (b); a circumferential disc protrusion (blue arrow).

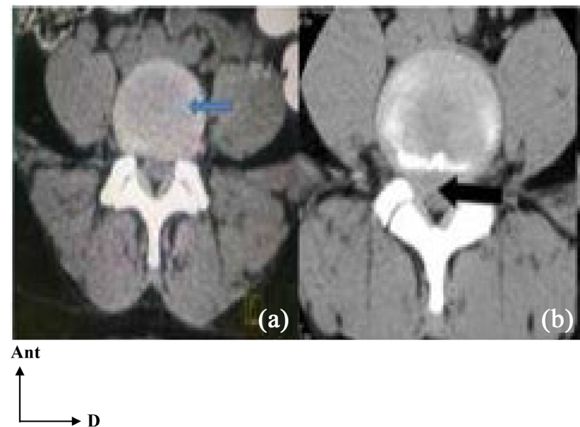

Figure 4. 59-year-old patient, lumbar spine CT scan in parenchymal window with axial reconstruction passing through the L4-L5 disc showing (a) circumferential disc protrusion (blue arrow) coming into contact with the dural sheath; in (b) a right paramedian disc protrusion (black arrow) compressing the dural sheath and conflicting with the right L5 root at its emergence.

4. Comments and Discussion

The limitations of our study include hospital recruitment, the absence of MRI correlation, and a possible measurement bias related to the exclusive use of CT scans and radiologist reports.

Our work is part of a 12-month prospective descriptive and analytical study on the contribution of CT scans in the diagnosis of disc-radicular conflicts in patients referred to the radiology department for CT scans of the cervical and lumbar spine. Recent meta-analyses and recommendations confirm the superiority of MRI for soft tissue/radiculopathies; CT scans remain important for bone lesions and if MRI is not available. WE wanted to highlight the diagnostic value of computed tomography in settings where access to MRI is limited.

During a 12-month period, from August 2023 to August 2024, we identified 172 patients who met our inclusion criteria, 112 of whom showed signs of disc-radicular conflicts with unusable clinical and scan data. We excluded patients whose records were incomplete and those who had no scan abnormalities. During our study, we encountered the following problems:

—The absence of certain necessary information from patients, such as medical history, is often linked to a lack of documentation of previous pathologies.

—The non-cooperation of some patients on certain items in the survey.

—The inaccessibility of some patients after obtaining their informed consent (travel, other social problems, etc.).

During our study, the average age of our patients was 49, with extremes of 25 and 77, and the 45 - 55 age group accounted for 30.4%. This result is similar to that of Carette S., Felhing M. G. [7].

This could be explained by the physiological ageing of the intervertebral discs in our series, as mentioned by other authors, since advanced age is considered one of the most important risk factors [8].

Males were in the majority, with a sex ratio of 1.29. This predominance of males was also found by B. Sawadogo [4]. According to this author, being male is a risk factor for disc-radicular conflicts, unlike being female, which has a protective role, particularly in limiting the deterioration of intervertebral discs.

In our series, we found that lumbosciatica was the most common reason for consultation, accounting for 41.1% of cases (**Table 1**). This result is similar to those of Sawadogo B. [7] and Berley J. [2], who found 34% and 40% respectively in their series.

We also found that 23.2% of our patients had chronic low back pain.

Cervicobrachial Neuralgia (CBN) was present in 9% of our patients.

Disc-radicular conflict refers to the compression or irritation of a nerve root by a damaged intervertebral disc, often as a result of a herniated or protruding disc. According to recent recommendations, diagnosis is based on a close correlation between clinical findings (typical radicular pain, motor or sensory disturbances in the neurological territory) and imaging, mainly MRI or CT scan [9].

In our study, 47.3% of our patients had segmental spinal stiffness, 9.8% of patients had scoliosis, and 8.9% of patients had a static abnormality such as spondylolisthesis (**Table 2**).

The remaining 24.1% of patients had no spinal static disorders.

In our series, 29.5% of patients had vertebral osteophytosis, 11.6% had vertebral compression, and 8.9% had diffuse bone demineralisation. It should be noted that 42% of patients had no vertebral abnormalities. This means that normal vertebral architecture does not rule out the presence of other abnormalities in the surrounding structures. This result is similar to that of H. Deme *et al.* [10], who found 43.3%.

In our series, 45 patients, or 40% of cases, had a narrow lumbar canal. Sonhaye *et al.* [11] in Togo found 6% of constitutionally narrow lumbar canals in their series.

The degree of stenosis is defined according to measurements, which can be absolute if the anteroposterior diameter is less than 10 mm and relative when the anteroposterior diameter is between 10 mm and 12 mm. Canal stenosis can be acquired, also known as a narrowed lumbar canal, and is mainly degenerative in origin.

In our study, canal narrowing was due to disc degeneration in more than 45% of patients over the age of 55. This result is similar to those of Berley J. *et al.* [12].

In our study, 62 patients, or 55.4% of cases, had disc protrusion (focal extension with intact external annulus, base wider than the herniation). These results are consistent with those of H. Deme *et al.* in Senegal, who found 44.1% [10].

The most commonly affected area was the lumbosacral spine, with more than half of the abnormalities found there. In a study conducted by Vital J. M. *et al.* [13], the lumbosacral spine accounted for 45.5% of the abnormalities found. These abnormalities are found in subjects over the age of 50 and are also known as sciatica in the elderly [14].

In our study, 37.8% of cases were foraminous, 36% extraforaminous, and 34% intracanalicular (**Table 4**). H. Deme *et al.* [10] observed 79.9% foraminous, 15.2% intracanalicular, and 10.9% extraforaminous cases.

The nerve root was swollen in 54.5% of cases, embedded in 11.6% of cases, and normal in appearance in 33.9% of cases. According to H. Deme *et al.* [10], 42 patients (62.7%) had root hypertrophy, which was thought to be responsible for the disc-root conflict. Experimentally, mechanical compression of the sciatic roots does not cause pain but rather paresthesia, and pain is only elicited if the root is already inflamed. Based on these arguments, Saal *et al.* [15] suggested that inflammation located at the interface between disc protrusion and epidural space could play a role in the genesis of discogenic sciatica (**Figures 3-4**).

However, a study reported in JHWCR and reproduced in StatPearls indicates that the most affected age group is 30 - 50 years old, but that many cases of disc herniation exist without pain; the clinical distinction between simple herniation and true disc-root conflict is therefore essential to guide treatment [16].

5. Conclusions

Computed tomography revealed abnormalities in 65% of patients who underwent spinal CT scans in our study. These abnormalities were disc disorders, particularly disc protrusion. CT scans allow for precise visualisation of bone structures and disc lesions, thereby contributing to a reliable diagnosis of disc-radicular conflict.

It remains a means of diagnosing the various pathologies responsible for disc-radicular conflicts in regions where access to magnetic resonance imaging is limited due to its limited availability and high cost, even though it remains the best modality for assessing spinal pathologies.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Fardon, D.F., Williams, A.L., Dohring, E.J., Murtagh, F.R., Gabriel Rothman, S.L. and Sze, G.K. (2014) Lumbar Disc Nomenclature: Version 2.0. Recommendations of the Combined Task Forces of the North American Spine Society, the American Society of Spine Radiology and the American Society of Neuroradiology. *The Spine Journal*, **14**, 2525-2545. https://doi.org/10.1016/j.spinee.2014.04.022

[2] Weber, H. (1983) Lumbar Disc Herniation: A Controlled, Prospective Study with Ten Years of Observation. *Spine*, **8**, 131-140. https://doi.org/10.1097/00007632-198303000-00003

[3] Diallo, M., Balé, S., Sonhaye, L., *et al.* (2022) TDM des anomalies lombaires: Étude prospective de 165 cas au Togo. *Journal Africain des Cas Clinique et Revues*, **6**, 52-58.

[4] Sonhaye, L., Balé, S., Kéli, P., *et al.* (2018) Aspects épidémiologiques, cliniques et étiologiques des lombosciatalgies chez l'adulte à Lomé (Togo). *Open Journal of Epidemiology*, **8**, 214-226.

[5] Field, J., Clark, D. and Ghosh, P. (2021) Implications of Age, Gender and Lumbar

Disc Level on Lumbar Disc Herniation. *Pakistan Journal of Medical & Health Sciences*, **15**, 2893-2898.

[6] Malakhanov, V.A., Seliverstov, P.V., Lubashev, Y.A. and Ratnikov, V.A. (2019) Computed Tomography Imaging of Degenerative Disease in the Lumbar Spine. *International Journal of Biomedicine*, **9**, 182-184. https://doi.org/10.21103/article9(2)_shc2

[7] Carette, S., Felhing, M.G., *et al.* (2005) Clinical Practice: Cervical Radiculopathy. *The New England Journal of Medicine*, **105**, 123-225.

[8] Vo, N.V., Hartman, R.A., Patil, P.R., Risbud, M.V. and Choi, K.S. (2016) Molecular Mechanisms of Biological Aging in Intervertebral Disc. *Aging and Disease*, **7**, 715-735.

[9] Dallaudière, B., Lecouvet, F.E., Vasiliki, E., *et al.* (2014) Clinical Relevance of Diffusion Tensor Imaging Parameters in Lumbar Disco-Radicular Conflict. *Diagnostic and Interventional Imaging*, **95**, 849-855.

[10] Deme, H., *et al.* (2018) CT Scan Findings of Lumbar Abnormalities in the Investigation of Low Back Pain at Kaolack Regional Hospital: 67 Cases. *Journal Africain d'Imagerie Médicale*, **12**, 20-26.

[11] Sonhaye, L., Balé, S., Tchaou, M., *et al.* (2014) Dimensions radio-anatomiques et particularités pathologiques du canal lombaire: À propos de 165 cas au Togo. *Santé*, **14**, 6-11.

[12] Berley, J., *et al.* (2013) In Their Study on Lumbar Disc Degenerative Disease, Canal Narrowing Attributable to Disc Degeneration Was Most Frequently Observed in Older Patients, with Age-Related Increase in Prevalence Especially in Those above 55 Years.

[13] Vital, J.M., Boissière, L. and Obeid, I. (2017) Lumbar Spinal Muscles and Spinal Canal Study by MRI. *Advanced Biomedical Engineering*, **7**, 13-21.

[14] Patel, B.B., Abdulla, M.C., Al-Hadidy, A.M., *et al.* (2020) Lumbosacral MRI Findings in Chronic Lower Back Pain. *Indian Journal of Public Health Research & Development*, **11**, 1206-1211.

[15] Saal, J.A. and Saal, J.S. (1989) Nonoperative Treatment of Herniated Lumbar Intervertebral Disc with Radiculopathy. *Spine*, **14**, 431-437. https://doi.org/10.1097/00007632-198904000-00018

[16] Dydyk, A.M., Das, M., Tale, A., *et al.* (2025) Disk Herniation. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK441822/