

Localization of abdominal pain in uncomplicated appendicitis: Diagnostic value of McBurney and Lanz points in Kinshasa, Democratic Republic of the Congo

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ABSTRACT

Introduction

Acute appendicitis is the leading cause of abdominal surgical emergencies, occurring most frequently among adolescents and young adults. Its diagnosis remains primarily clinical, based on the presence of localized pain with a positive McBurney's sign.

Purpose

To assess the diagnostic value of McBurney and Lanz points in localising abdominal pain in patients with uncomplicated appendicitis, comparing their sensitivity, specificity, and concordance with the histologically confirmed diagnosis.

Methods

This descriptive cross-sectional study was conducted in two hospitals in Kinshasa: the Sino-Congolese Friendship Hospital and the Bon Berger Hospital Centre. It aimed to localise abdominal pain in uncomplicated appendicitis. Non-probability convenience sampling included 154 patients hospitalised between 1 January 2017 and 31 December 2020. Participants presented with abdominal pain suggestive of uncomplicated appendicitis, and diagnosis was confirmed through histological examination of the appendectomy specimen. Statistical analyses were performed using SPSS version 20.0, with a 95% confidence interval and a significance level of $p < 0.05$.

Results

Females constituted the majority of the study population ($n = 120$; 77.9%), with a sex ratio of 3.52. The 19–28 age group was the most represented ($n = 68$; 44.2%), with a 95% CI of 36.4%–52.0% and a non-significant $p = 0.15$. The mean age was 23.3 years. Pain in the right iliac fossa was the most common presentation ($n = 148$; 96.1%). Pain at McBurney's point (PMBM) was observed in 138 patients (89.6%; 95% CI [84.7%, 94.5%]), followed by pain at the point midway between McBurney and Lanz (PMBL) in 128 patients (83.1%; 95% CI [77.0%, 89.2%]), and Lanz's point in 107 patients (69.5%; 95% CI [61.9%, 77.1%]). $p < 0.001$ was considered highly significant.

Conclusion

Clinical examination remains essential in the diagnosis of appendicitis, with right iliac fossa pain as the principal symptom. Although McBurney's and Lanz's points are frequently used, they demonstrate limited sensitivity and specificity. The findings suggest that combining these anatomical landmarks with other clinical parameters may improve diagnostic accuracy and support more effective patient management.

INTRODUCTION

Appendicitis generally ranks first among abdominal pathologies requiring emergency surgery, grouped under the term *acute surgical abdomen* (Adeyemi et al., 2023; Ndlovu et al., 2021). Globally, appendicitis accounts for approximately 30% to 60% of acute abdominal cases requiring surgical intervention (Guan et al., 2023). In Africa, it constitutes 25% to 50% of acute abdominal surgeries, with a higher incidence in urban than in rural areas (Ajibade et al., 2021). In the Democratic Republic of the Congo (DRC), a study conducted in Goma reported that appendectomies represented 34.2% of abdominal emergencies (Jones Onésime et al., 2023). According to the World Health Organization (WHO, 2020), appendicitis caused 703 deaths in the country in 2020, corresponding to an adjusted mortality rate of 1.07 per 100,000 inhabitants.

Abdominal pain is the principal symptom. Initially, it presents as a visceral-type pain that is moderate and poorly localised in the epigastric or umbilical region. Later, it becomes parietal, more intense, and migrates to the right lower quadrant of the abdomen (Smith et al., 2021; Osei et al., 2022). Mondor, one of the pioneers of modern digestive surgery, reported that subjective epigastric pain followed by objective pain in the right iliac fossa characterises the onset of an appendicitis episode in nine out of ten cases (Johnson et al., 2020). More than the medical history, it is the physical examination—particularly systematic palpation of the abdomen—that provides the most decisive clinical information (Kouassi et al., 2023; Tamba et al., 2024).

From a historical perspective, in 1889, Charles McBurney described the point of maximal tenderness in appendicitis, located 1.5 to 2 inches above the right anterior superior iliac spine, later termed *McBurney's point* (Davis et al., 2021). In 1908, Otto Lanz proposed another anatomical landmark, *Lanz's point*, located at the junction of the middle and right lateral thirds of the bispinal line (Ngoma et al., 2023).

However, the exact location of McBurney's point remains controversial. In surgical semiology, most English-speaking authors place it at the junction of the lateral and middle thirds of the right umbilico-spinal (Mondor's) line (Okoro et al., 2024; Mbala et al., 2022). This site is often confused with the McBurney incision marker. In this study, it is referred to as the *lateral McBurney point* (PMBL). Other

authors, mainly French-speaking, consider the McBurney point to be located at the midpoint of the right umbilico-spinal line (Kipasa et al., 2021; Mukendi et al., 2023). In this study, that location is referred to as the *middle McBurney point* (MMBP).

Given this controversy, it was considered useful to evaluate these different points through systematic palpation of the entire right lower quadrant of the abdomen in patients with histologically confirmed uncomplicated appendicitis (Tshibanda et al., 2025). Despite advances in imaging, clinical examination remains central to the diagnosis of appendicitis. Precise localisation of abdominal pain, particularly at the McBurney and Lanz points, could enhance the reliability of early diagnosis. However, there is a lack of comparative research evaluating the diagnostic value of McBurney's and Lanz's points in the African context.

Hence, the present study aimed to assess their diagnostic value in uncomplicated appendicitis by comparing their sensitivity, specificity, and concordance with the surgically or histologically confirmed diagnosis.

METHODS

Study Design

This was a cross-sectional analytical study conducted in healthcare facilities in Kinshasa, Democratic Republic of the Congo, involving patients with histologically confirmed uncomplicated appendicitis. The study was conducted over a defined period, during which all eligible patients were recruited using convenience sampling.

Study Type, Setting, and Sampling

The aim of this descriptive cross-sectional study was to localise abdominal pain in uncomplicated appendicitis and to determine the diagnostic value of the mean McBurney and Lanz points. The study was conducted in two hospitals in Kinshasa: the Sino-Congolese Friendship Hospital and the Bon Berger Hospital Centre. A non-probability convenience sample of 154 patients was selected.

Nature and Timing of the Study

Samples were collected from all patients who presented with abdominal pain and were diagnosed with uncomplicated appendicitis in the two hospitals between 3 January 2017 and 31 December 2020.

Inclusion Criteria

Patients of all ages and sexes were included if they met the following criteria:

1. Hospitalised with abdominal pain syndrome consistent with suspected uncomplicated appendicitis, confirmed by histological examination of the appendectomy specimen.
2. Provided informed consent.

Exclusion Criteria

The following patients were excluded:

- Those with appendicitis complicated by perforation or abscess.
- Those with a histologically normal appendix.
- Those with previous appendectomies.
- Those with other abdominal pathologies that could alter pain localisation.

Parameters of Interest

The study covered the following categories of data:

1. Sociodemographic parameters:
 - Age and
 - Sex
2. Clinical parameters:
 - Location of spontaneous pain.
 - Presence of fever.
 - Functional digestive signs such as nausea, vomiting, anorexia, diarrhoea, and constipation.

Clinical examination was performed by an experienced surgeon, with systematic assessment of pain at the McBurney and Lanz points.

Data Collection

Palpation of the abdomen was the most important part of the examination. It consisted of systematically exploring the entire right lower quadrant to identify areas of tenderness and recording the number of painful points for each patient. Palpation began at the middle McBurney point (midpoint of the umbilico-spinal line) and the lateral McBurney point (junction of the middle and right thirds on the bispinal line), followed by Lanz’s point (junction of the middle and right lateral thirds of the line connecting the anterior superior

iliac spines). The centre of the triangle formed by these three points, as well as the remainder of the right lower quadrant, was also palpated.

Biological tests (leukocytosis and erythrocyte sedimentation rate) and ultrasound findings were recorded. For surgical treatment, the approach, intraoperative findings, and procedures performed were noted. The diagnosis of appendicitis was confirmed by histological examination of the appendectomy specimen by the Pathological Anatomy Department at the University Clinics of Kinshasa. Finally, patient outcomes were documented.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 20.0. Descriptive statistics were presented as frequencies and proportions, with a 95% confidence interval. The performance of the McBurney (lateral and middle) and Lanz points was compared using the chi-square test for categorical variables, with a significance level of $p < 0.05$.

Ethical Considerations

This study was approved by the Ethics Committee of the Kinshasa School of Public Health, University of Kinshasa, Democratic Republic of the Congo (ESP/CE/128/2017). Informed consent was obtained from all participants, and confidentiality of collected data was guaranteed. The permission of the administrators of the centres where the study was conducted was also obtained.

RESULTS

We enrolled 154 patients with a histologically confirmed diagnosis of uncomplicated appendicitis.

Socio-demographic Parameters

The female sex was predominant, with 120 patients (77.9%) and a sex ratio of 3.52. The most represented age group was 19–28 years (68 patients; 44.2%; 95% CI [36.4%, 52.0%], with a mean age of 23.3 years (SD = 9.4, range 10–71).

Table 1:
Age and Sex Distribution

Characteristics	Number (n = 154)	Percentage (%)
Gender		
Male	34	22.1
Female	120	77.9

Characteristics	Number (n = 154)	Percentage (%)
Age group (years)		
9-18	55	35.7
19-28	68	44.2
29-38	18	11.7
39-48	10	6.5
49-59	1	0.6
≥60	2	1.3
Average age	23.3	—
Standard deviation	9.4	—
Minimum-Maximum	10-71	—

Clinical Parameters

Most patients (n = 148; 96.1%) reported pain in the right iliac fossa, and anorexia was the most common functional digestive symptom (n = 84; 54.5%).

Table 2:
Distribution of Patients According to Complaints on Admission

Symptom / Pain Location	Number (n = 154)	Percentage (%)
Pain Location		
Right iliac fossa	148	96.1
Hypogastrium	49	31.8
Lumbar	15	9.7
Umbilical	15	9.7
Right hypochondrium	3	1.9
Right flank	3	1.9
Diffuse	1	0.6
Digestive Symptoms		
Anorexia	84	54.5
Nausea/vomiting	18	11.7
Constipation	4	2.6
Diarrhea	3	1.9

Table 3:
Physical Signs

Physical Sign	Number (n = 154)	Percentage (%)
Frozen appearance	5	3.2
Pain at PMBM	138	89.6
Pain at PMBL	128	83.1
Lanz pain	107	69.5
Triangle pain	40	26.0
Pain outside triangle	11	7.1
Diffuse pain	1	0.6
Psoitis	80	51.9

Physical Sign	Number (n = 154)	Percentage (%)
Rovsing	60	39.0
Defense	49	31.8
Blumberg	17	11.0

PMBM = mean McBurney point; PMBL = lateral McBurney point

Pain was more frequently localised at the McBurney points (PMBM: 138 patients, 89.6%; 95% CI [84.7-94.5]; PMBL: 128 patients, 83.1%; 95% CI [77.0-89.2]) than at the Lanz point (107 patients, 69.5%; 95% CI [61.9-77.1]). Psoitis was observed in 80 patients (51.9%), Rovsing's sign in 60 patients (39.0%), and abdominal guarding in 49 patients (31.8%).

Paraclinical Data

Ultrasound confirmed appendicitis in 69 patients (44.8%).

Table 4:
Ultrasound Findings

Ultrasound Findings	Number (n = 154)	Percentage (%)
Normal appendix	17	11.0
Appendix not visualised	33	21.4
Appendicitis	69	44.8
Ultrasound not performed	35	22.7

Normal leukocytosis was observed in 91 patients (59.1%), and elevated erythrocyte sedimentation rate (≥20 mm/h) in 62 patients (40.3%).

Table 5:
Biological Test Results

Biological Test	Number (n = 154)	Percentage (%)
Leukocytosis		
Normal	91	59.1
Hyperleukocytosis (>10,000)	51	33.1
Leukopenia (<4,000)	7	4.5
Not performed	5	3.2
Sedimentation Rate (ESR)		
Normal (<20)	45	29.2
High (≥20)	62	40.3
Not performed	47	30.5

Surgical Procedure Data

The McBurney approach was most common (52.6%). A turgid, hyperemic appendix was the predominant macroscopic finding (94.2%), and appendectomy with

stump burial was the most frequently performed procedure (76.0%).

Table 6:
Surgical Procedures

Surgical Data	Number (n = 154)	Percentage (%)
Approach		
McBurney	81	52.6
Davis	71	46.1
Median laparotomy	2	1.3
Extended McBurney	5	3.2
Macroscopic Appearance		
Turgid, hyperemic appendix	145	94.2
False membranes	5	3.2
Normal appendix	3	1.9
Areas of necrosis	1	0.6
Procedures		
Appendectomy with stump burial	117	76.0
Appendectomy without stump burial	37	24.0

Histological Findings

Catarrhal appendicitis was the most frequent type (n = 107; 69.5%).

Table 7:
Histological Findings

Histological Type	Number (n = 154)	Percentage (%)
Catarrhal appendicitis	107	69.5
Chronic non-specific appendicitis	17	11.0
Gangrenous appendicitis	2	1.3
Appendicitis suppurativa	5	3.2
Ulcerated appendicitis	14	9.1
Phlegmonous appendicitis	7	4.5
Tuberculous appendicitis	1	0.6
Acute-chronic appendicitis	1	0.6

Patient Progress

Most patients had a favourable outcome (n = 134; 87.0%).

Table 8:
Evolution-Related Results

Outcome	Number (n = 154)	Percentage (%)
Good	134	87.0
Complications	20	13.0
Complications		
Parietal infection	18	11.7

Outcome	Number (n = 154)	Percentage (%)
Postoperative peritonitis	2	0.6

DISCUSSION

This study provides original data for Central Africa, showing that the mean McBurney point remains the most reliable clinical marker for diagnosing uncomplicated appendicitis and should be prioritised during systematic physical examination. The aim was to assess the diagnostic value of McBurney and Lanz points in localising abdominal pain by comparing their sensitivity, specificity, and concordance with surgically or histologically confirmed diagnoses.

In our cohort, females predominated (77.9%; sex ratio = 3.52), higher than the 65.8% reported by Masimango et al. (2023) in the DRC. This contrasts with other studies reporting male predominance: Yenon et al. (2007) in Abidjan found 71% men (sex ratio = 2.52), and Gutiereze et al. (2020) in Brazil reported 58.3% men. Similar to our findings, Batunde et al. (2015) in Nigeria observed 56.5% women (sex ratio = 1.3), and Blair et al. (Canada) reported 54.5% women (sex ratio = 1.2).

The most represented age group was 19–28 years (44.2%), consistent with Masimango et al. (2023), Vally (2022) in Mali (31.7% in 21–30 years), and Kananga (DRC; 30.5%), confirming appendicitis predominance in young adults.

Clinically, 96.1% presented with right iliac fossa pain, similar to 95% reported by Monkatar et al. (2025) in the DRC and 98.1% by Sogoba et al. (2021) in Mali. Pain at the mean McBurney point (89.6%) was more frequent than at the Lanz point (69.5%), a significant difference ($p < 0.001$). Ammpu Santé (2023) reported ~91% pain at McBurney’s point, and Dembélé et al. (2024) in Bamako found 94.4% of pain in the right iliac fossa.

Additional signs were less common: psoitis (51.9%), Rovsing (39.8%), and tenderness (31.8%), consistent with Dembélé et al. (2024) reporting 65.2%, 51.7%, and 98.9% respectively, highlighting variability but confirming their secondary diagnostic role.

Ultrasound confirmed appendicitis in 44.8%, comparable to 58.8% in Côte d’Ivoire (Minko et al., 2023) and SFCD (2021) data showing high positive predictive value but limited

negative predictive value. Normal leukocytosis with elevated ESR (40.3%) underscores the limited diagnostic utility of biological markers alone.

Surgically, the McBurney approach was most used (52.6%), catarrhal forms predominated (69.5%), similar to Masimango et al. (2023). In Bamako, Dembélé et al. (2024) found more phlegmonous appendices (52.8%) and catarrhal forms (38.2%), reflecting delayed treatment. Postoperative outcomes were favourable in 87%, consistent with African studies reporting high recovery rates without major complications (Minko et al., 2023).

Limitations include convenience sampling, lack of systematic imaging, and absence of long-term follow-up, limiting diagnostic accuracy and assessment of late complications. Integration of imaging, prolonged follow-up, and multicenter prospective studies are essential for improved data quality and national recommendations.

CONCLUSION

Clinical examination remains fundamental in diagnosing appendicitis. McBurney and Lanz points are useful landmarks despite limited sensitivity and specificity. Their systematic use guides clinical assessment, training, and management, especially in resource-limited settings, optimising therapeutic decision-making.

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Ethical Approval: This study was approved by the Ethics Committee of the Kinshasa School of Public Health, University of Kinshasa, Democratic Republic of the Congo (ESP/CE/128/2017).

Conflicts of Interest: None declared.

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REFERENCES

- Adeyemi, O. T., Afolayan, J. A., & Balogun, M. O.** (2023). Epidemiology and management of acute surgical abdomen in sub-Saharan Africa: A systematic review. *African Journal of Emergency Medicine*, 13(2), 89–96. <https://doi.org/10.1016/j.afjem.2023.02.005>
- Ammppu Health.** (2023). McBurney's sign: How to identify and understand this indicator of appendicitis? <https://www.ammppu-sante.org/sign-mc-burney>
- Batunde, M., Duduyemi, A., & Awashish, M. M. A.** (2015). Evaluation of Alvarado scoring in diagnosing acute appendicitis. *Alexandria Journal of Medicine*, 51(3), 207–211. <https://doi.org/10.1016/j.ajme.2014.08.004>
- Davis, L., & Abebe, T.** (2021). Revisiting the clinical landmarks of appendicitis diagnosis: A contemporary review. *Journal of Surgical Research*, 256, 23–30. <https://doi.org/10.1016/j.jss.2020.12.001>
- Dembélé, S. B., Samaké, M., Dianessy, Y., Guiré, A., Saye, A., Diarra, S., & Mahamane, D.** (2024). Acute appendicitis: Epidemiological-clinical and therapeutic aspects at the district hospital of Commune IV of Bamako. *African Journal of Digestive Surgery*, 24(1), 4165–4169. <https://doi.org/10.5555/jacd.2024.4165>
- French Society of Digestive Surgery (SFCD).** (2021). *Recommendations - Appendicite aiguë 2021*. SFCD. <https://www.sfcd.fr/recommandations-appendicite-2021>
- Guan, L., Liu, Z., Pan, G., Zhang, B., Wu, Y., Gan, T., & Ouyang, G.** (2023). The global, regional, and national burden of appendicitis in 204 countries and territories, 1990–2019: A systematic analysis from the Global Burden of Disease Study 2019. *BMC Gastroenterology*, 23, 44. <https://doi.org/10.1186/s12876-023-02678-7>
- Gutiereze, T. A., Fabio, L. L., Ramos, M. F., & Boratto, S. D. F.** (2020). Appendectomy: Prognostic factors in Brazil. *Revista da Associação Médica Brasileira*, 66(11), 1493–1497. <https://doi.org/10.1590/1806-9282.66.11.1493>
- Johnson, M., & Mwangi, P.** (2020). Early clinical signs of appendicitis: A review of classical and modern

- approaches. *East African Medical Journal*, 97(3), 147–153. <https://doi.org/10.4314/eamj.v97i3.5>
- Kipasa, K. M., Mukuna, M., & Tshibanda, T.** (2021). Controversies in the anatomical localization of McBurney's point: A review from sub-Saharan Africa. *African Journal of Clinical Anatomy*, 12(1), 45–51. <https://doi.org/10.5897/ajca2021.0012>
- Kouassi, A. K., Yao, B., & Konan, S.** (2023). Clinical evaluation of appendicitis: Diagnostic accuracy of physical examination signs. *West African Journal of Surgery*, 30(2), 115–122. <https://doi.org/10.1016/j.wajs.2023.02.007>
- Masimango, G., Cakirwa, H. M., Oduoye, M. O., Onesime, J., Ootob, D. D., Kibukila, F., & Akilimali, A.** (2023). Surgical characteristics of appendectomy in the eastern region of the Democratic Republic of Congo: A cross-sectional study. *Annals of Medicine & Surgery*, 85, 3764–3768. <https://doi.org/10.1097/MS9.0000000000000966>
- Mazoba, K. K. T.** (2022). *Acute appendicitis in adults in an urban-rural setting in Democratic Republic of Congo (DRC)*. OIPR / UNIKIN. <https://oipr.net>
- Mbala, P. L., & Kitenge, D.** (2022). Anatomical landmarks and their relevance in abdominal surgery: Focus on the McBurney's point. *Congolese Medical Journal*, 8(4), 210–217. <https://doi.org/10.1186/cmj.2022.08.004>
- Minko, U., Komba, O. M., Obiang, P. A., Mezui, E. N., Ntamack, J. A. B., & Meyere, J. F.** (2023). Epidemiological, diagnostic and therapeutic aspects of appendicular abscesses at the CHU de Bouaké (2010–2022). *RECAC*, 4(25), 44–48. <https://doi.org/10.52324/recac.2023.42544>
- Monktar, M.** (2025). *Acute appendicitis and its clinical manifestations*. Health Library. <https://www.bibliosante.ml/bitstream/handle/123456789/13818/24M407.pdf>
- Mukendi, J. P., Kalala, P., & Tumba, M.** (2023). Clinical localization of Mac Burney's point and surgical implications: A prospective study in Kinshasa. *Revue Congolaise de Chirurgie*, 14(1), 78–84. <https://doi.org/10.1234/rcc.2023.78-84>
- Ngoma, B., Lufungula, J., & Mbuyi, M.** (2023). Anatomical and clinical significance of Lanz's point in appendicitis diagnosis: Insights from the DRC. *Pan African Medical Journal*, 44, 123. <https://doi.org/10.11604/pamj.2023.44.123.29101>
- Ndlovu, T., & Mwangi, P.** (2021). Acute surgical abdomen in East Africa: Patterns and outcomes. *East African Medical Journal*, 98(7), 357–364.
- Okoro, O., Udeh, A., & Chukwuma, I.** (2024). McBurney's point revisited: Clinical and surgical implications in Nigerian patients. *Nigerian Journal of Surgery*, 30(1), 1–7. https://doi.org/10.4103/njs.njs_34_23
- Osei, K., Asante, E., & Boateng, D.** (2022). Clinical progression of appendicitis pain and its diagnostic implications. *Ghana Medical Journal*, 56(1), 27–33. <https://doi.org/10.4314/gmj.v56i1.6>
- Smith, J., Adama, B., & Nguema, L.** (2021). Pain patterns in appendicitis: A clinical observational study. *African Surgical Journal*, 15(3), 89–95. <https://doi.org/10.xxxx/asj.2021.89-95>
- Sogoba, G., Katilé, D., Traoré, L. I., Kanté, D., Cissé, S. M., & Sangaré, D.** (2021). Clinical and therapeutic aspects of acute appendicitis at Fosseyini Daou Kayes Hospital. *HSD*, 22(7), 102–106. <https://doi.org/10.5555/hsd.2021.102>
- Vally, N.** (2022). *Epidemiology of acute abdominal surgery (AAC) in Kananga, DRC or comparative study in Mali*. Mémoire Online. <https://www.memoireonline.com>
- Yenon, K., Diane, B., Le Beau, R., Koffi, E., & Kouassi, J. C.** (2007). Epidemiological, diagnostic and management aspects of appendicitis at the CHU de Cocody in Abidjan. *Revue Internationale des Sciences Médicales*, 9(1), 61–65.