Diaphragmatic endometriosis in African women: a case series highlighting multidisciplinary management

Yamal Patel[1], Kennedy Malele[2*], Joseph Santeto[3], Alin Constantin[4], Joseph Njagi[5], Charles Muriuki[5]

European Journal of Medical Case Reports
Volume 10(5):143–148
DOI: 10.24911/ejmcr.9-2426

ABSTRACT

Background: Diaphragmatic endometriosis (DE) is a rare and often underdiagnosed manifestation of extrapelvic endometriosis, with significant underreporting in the indigenous African population. It usually presents with atypical thoracic symptoms, often leading to delayed diagnosis.

Case Presentation: We present three African women with pelvic endometriosis and cyclical thoracic symptoms suggestive of DE. Case 1 involved a 32-year-old nulligravida with dysmenorrhea, cyclical haemoptysis, and right pleural effusion. Magnetic resonance imaging (MRI) showed lesions on the right side of her diaphragm. She underwent laparoscopic full-thickness excision of the lesions and diaphragmatic repair. She was managed postoperatively with dienogest (Endogest: 2 mg), with notable improvement at 3, 6, and 12-month follow-ups. Case 2 involved a 33-year-old nulliparous with previous pelvic endometriosis. She presented with cyclical dyspnea and recurrent right chest pain with subsequent developing hemopneumothorax. She had multiple video-assisted thoracoscopic procedures to excise some of her diaphragmatic and pulmonary lesions, and pleurodesis, and received a GnRH agonist post-operatively (11.25 mg). She stabilized on this treatment, with notable improvement at 6-month and 12-month follow-up. Case 3 involved a 29-year-old nulliparous woman with suspected pelvic endometriosis, presenting with cyclical right-sided chest pain. MRI shows right diaphragmatic nodule. She underwent laparoscopic excision of pelvic and diaphragmatic endometriotic nodules. She was managed postoperatively with dienogest (Endogest: 2 mg) and demonstrated notable improvement at 3 months and 6 months follow-up. Histopathological analysis confirmed diaphragmatic endometriosis in the three cases.

Outcomes: All three patients achieved significant thoracic symptom relief after surgery and hormonal suppression on 3-12 months follow-up. While two patients maintained symptom control throughout, one patient (Case 2) developed recurrent symptoms requiring additional medical treatment.

Conclusion: This case series outlines the clinical diversity of DE and the rarity of the diagnosis among women in Africa, strengthening the rationale for considering cyclical thoracic symptoms in women with pelvic disease. Imaging studies are supportive of diagnosis, but surgical and histology confirmation remains crucial. Long-term follow-up and multidisciplinary care are necessary to limit recurrence and ensure favorable outcomes.

Keywords: Diaphragmatic endometriosis, pelvic endometriosis, VATS, hemidiaphragm, laparoscopy, case series.

Type of Article: CASE SERIES **Specialty:** Obstetrics and Gynaecology

Correspondence to: Kennedy Malele
*Research and Biostatistics, 3rd Park Hospital, Nairobi, Kenya.
Email: kennedy.malele@gmail.com
Full list of author information is available at the end of the article.

Received: 15 November 2025
Revised (1): 02 January 2026
Accepted: 12 February 2026

Introduction

Endometriosis is a chronic inflammatory disease characterized by the presence of endometrial-like tissue outside the uterine cavity [1,2]. While the disease mostly affects pelvic structures, there is increasing involvement of extrapelvic areas such as the diaphragm. Diaphragmatic endometriosis (DE) occurs in less than 2% of all cases, and typically accompanies severe pelvic endometriosis [3-7]. DE involves respiratory and thoracic symptoms that can overlap with those of other pulmonary or musculoskeletal conditions [8,9]. These symptoms most often present as cyclical right-sided chest pain, shoulder pain, dyspnea, catamenial pneumothorax or hemoptysis, and usually coincide with the menstrual cycle. Their cyclical presentation is a crucial clinical clue for distinguishing DE from other thoracic pathologies [9,10]. The non-specific presentations often lead to delayed diagnosis and disease progression [11], and some patients (up to 70%) remain asymptomatic at the time of diagnosis.

The exact pathogenesis of DE is still debated, but it is hypothesized that DE may arise from retrograde menstruation or pelvic peritoneal spread to the hemidiaphragm, metaplasia of coelomic epithelium, and or lymphatic/

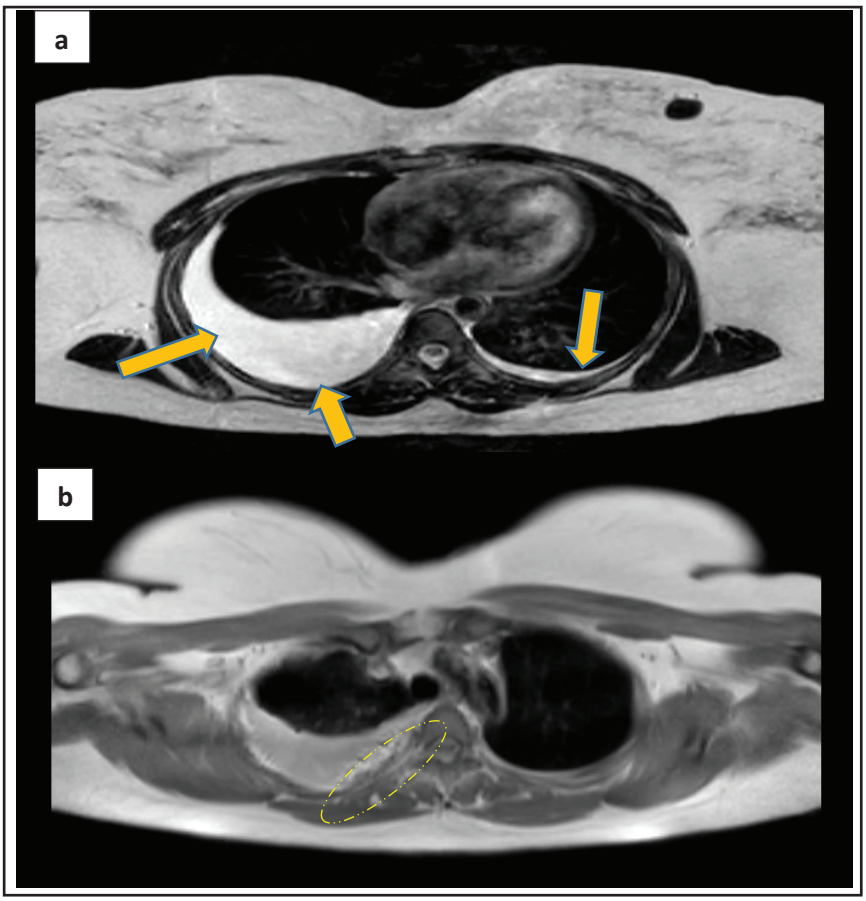

Figure 1. *(a) The axial view of thoracic MRI showing a moderate right pleural effusion, and a minimal left pleural effusion - (Yellow arrows). (b) The axial view of thoracic MRI showing multiple contrast-enhancing irregular foci along the right pleura suggestive of possible ectopic endometriotic implants.*

hematogenous spread [2,4,7,12,13]. Right side hemidiaphragm predominance is postulated to be related to the dynamics of the peritoneal fluid environment and the presence of fenestrations in the diaphragm [13,14]. Diagnosis involves a high degree of suspicion. Magnetic resonance imaging (MRI) and Computed Tomography (CT) scans may show diaphragmatic nodules or pleural effusion, yet their specificity is limited [9,15]. Definite diagnosis and treatment rely on surgical visualization and excision-most often by laparoscopy or video-assisted thoracoscopic surgery (VATS) [2,12]. Post-operative hormonal therapy with progestins or GnRH agonists provides long-term control of the disease [3,5].

Current literature on thoracic and diaphragmatic endometriosis is primarily from other regions, including North America, Europe, and Asia. Data on African populations are limited, which can be attributed to the underdiagnosis, lack of access to advanced imaging technology and specialized surgical care, and under-reporting. This case series aims to highlight the variation in clinical presentations, the diagnostic challenges involved, and the need for multidisciplinary management of the disease in African populations.

Case Presentation

Case 1

A 32-year-old nulligravid African female presenting with severe dysmenorrhea, cyclical hemoptysis, right pleural effusion, and subfertility. She expressed a desire for fertility treatment and pain management. She had experienced pelvic pain for several years before the cyclical thoracic symptoms. Physical examination revealed a large retro-cervical retro-uterine nodule. Chest MRI showed right pleural effusion and suspicious diaphragmatic lesions (Figure 1). Transvaginal ultrasound showed deep infiltrating pelvic endometriosis and adenomyosis. The pre-operative #Enzian classification was: #Enzian$_{(u)}$: [O0/3, T3/3, A2, B2/2, C2, FA]. The patient underwent laparoscopic excision of the pelvic and diaphragmatic endometriotic lesions, including full-thickness resection of the right hemidiaphragm implant, extensive adhesiolysis of pleural adhesions, and peritoneal drainage of the right pleural effusion. The intraoperative diaphragmatic lesions were characterized by fibrosis, with regions of thinned muscle consistent with endometriotic infiltration (Figure 2). The diaphragmatic defect was repaired using 1–0 barbed suture (Figure 3). Following the final stitch and prior to

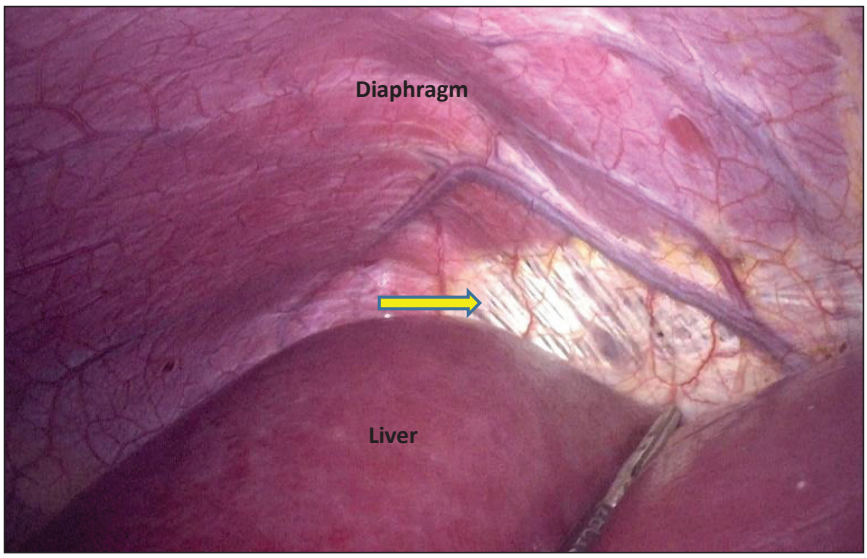

Figure 2. *Laparoscopic abdominal view of the diaphragm showing diaphragmatic endometriosis manifesting as fibrotic white lesions (Case #1).*

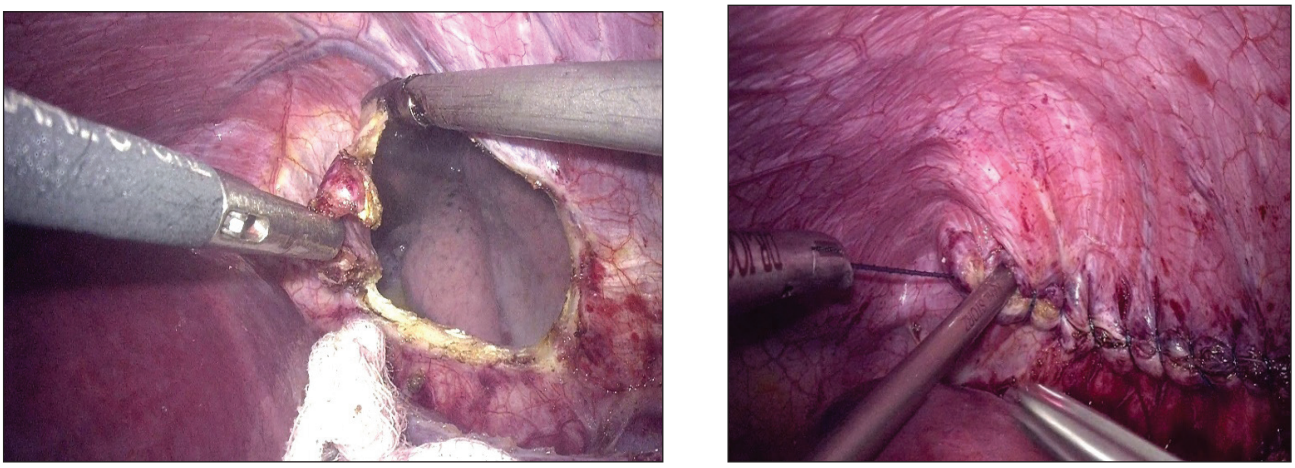

Figure 3. *Laparoscopic full-thickness excision of the endometriotic lesion on the right hemidiaphragm, showing a diaphragmatic defect (Left). Diaphragmatic defect repaired using V-loc sutures (right).*

tightening, a suction cannula was introduced through the stitch. The lungs were fully inflated with activation of suction. The suction cannula was withdrawn as the last stitch was tightened. Histopathology confirmed endometriosis. The patient experienced significant postoperative improvement and was discharged on hormonal suppression with dienogest (Endogest: 2 mg, 3 cycles) and at 3, 6, and 12-month follow-ups reported marked relief of symptoms.

Case #2

A 33-year-old nulliparous African woman who had by then experienced recurrent cyclical dyspnea and right-sided chest pain for 18 months. Pelvic symptom manifestations preceded thoracic symptoms. She had undergone laparoscopic excision of pelvic endometriosis 2 years prior to the current presentation. She developed acute dyspnea and hypoxia shortly after the surgery, and a chest x-ray and CT scan revealed a hydrothorax and pulmonary embolism. The hydrothorax was drained and the pulmonary embolism was managed as a postoperative thromboembolic complication. During her later menstrual cycles, she experienced chest discomfort, leading to a suspected diagnosis of thoracic endometriosis. She received 10.8 mg of gonadotropin-releasing hormone agonist (GnRHa) subcutaneously later that year but developed a hemopneumothorax, necessitating right pleurocentesis with drainage of 500 ml.

She demonstrated reduced right-sided breath sounds during thoracic episodes and adnexal tenderness on pelvic examination. An in-house Transvaginal ultrasound showed deep infiltrating pelvic endometriosis, adenomyosis, myomas, and a right hydrosalpinx. The pre-operative #Enzian classification was: #Enzian$_{(u)}$: [T3/2, A2, C2, FA] + Myoma + Right hydrosalpinx. Following acute deterioration with chest pain and dyspnea, emergency chest tube

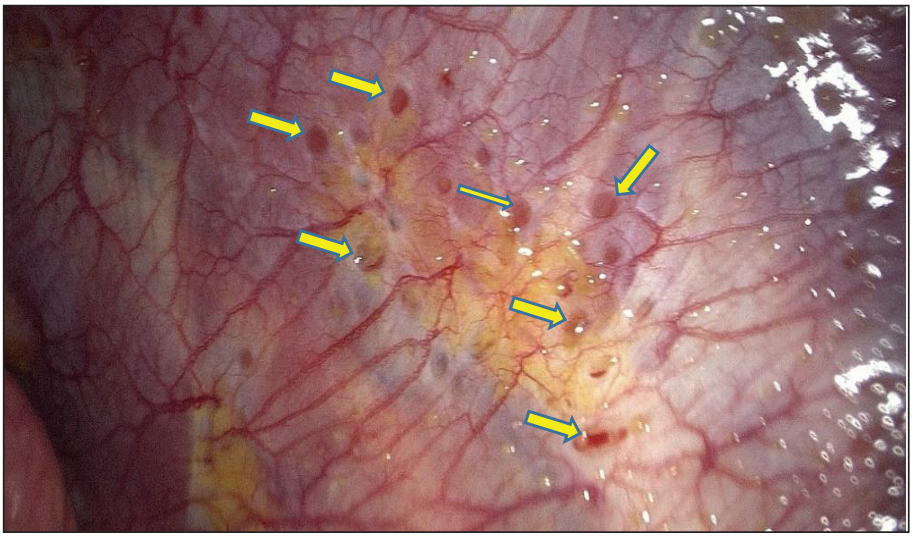

Figure 4. *Thoracoscopic aspect of diaphragmatic endometriosis as established in Case #2. The yellow arrows highlight the fenestrations on the diaphragm's thoracic surface (foci of sub-centimeter endometrial tissue implanted diffusely).*

insertion was performed. She subsequently underwent three VATS. The initial VATS was performed to manage the hemopneumothorax following the failed chest-tub insertion. The subsequent VATS procedures were performed due to ongoing and worsening symptoms of hydropneumothorax and imaging evidence of thoracic disease, with clinical evidence being the main driver of when each procedure was conducted rather than following a previously passed schedule. Thoracoscopy revealed extensive endometriosis involving the right hemidiaphragm and lung parenchyma, with multiple diaphragmatic fenestrations, thinning of the diaphragmatic muscle, pleural nodules, and bullous lung lesions (Figure 4). A diaphragmatic defect was noted near the midline. Lung parenchymal lesions, pleural nodules, and diaphragmatic implants were excised, and chemical pleurodesis was performed using doxycycline. Histopathology demonstrated fibrotic tissue with cystic hemorrhage and features consistent with endometriosis and chronic inflammation. Post-discharge, the patient received GnRHa therapy (11.25 mg). She experienced intermittent postoperative recurrence manifested by hemothorax, which required repeat chest drainage and a subsequent episode of fever with severe pneumohemothorax. This necessitated high-dependency unit admission and surgical drainage of purulent collections. She was discharged with a chest drain for ongoing monitoring. With continued stabilization on hormonal suppression, she demonstrated marked symptomatic improvement with resolution of chest pain and normalization of her inflammatory markers at 6-month and 12-month follow-ups, and no further major thoracic complications or events.

Case #3

A 29-year-old nulliparous African female presenting with recurrent right-sided chest pain. Her thoracic symptoms became a significant presenting complaint with the known pelvic disease. A pelvic examination revealed site-specific tenderness as well as uterine fixation. An in-house transvaginal ultrasound scan revealed features suggestive of adenomyosis and deep infiltrating pelvic endometriosis (a retroverted uterus adherent to bowel with a negative posterior sliding sign, right ovarian adhesions to the pelvic side wall, uterus and bowel, torus nodularity, and non-visualization of the left ovary. The left ovary was not visible. The pre-operative #Enzian classification was: #Enzian$_{(u)}$: [T3/3, A3, FA]. MRI revealed a diaphragmatic nodule on the right lateral aspect. Laparoscopic surgery confirmed pelvic endometriosis and full-thickness diaphragmatic disease, with the liver adherent to the right lateral hemidiaphragm. A laparoscopic full thickness excision of the diaphragmatic lesion was performed with a two-layer repair with barbed sutures (size 1-0), with intraoperative lung re-expansion prior to the final knot tightening. The pelvic endometriotic nodules were also excised laparoscopically. Histology confirmed diaphragmatic endometriosis and pelvic endometriosis. She was discharged on hormonal suppression (Endogest: 2 mg) and at 3 months and 6 months follow-up, she reported significant improvement in thoracic pain and had no evidence of recurrence.

Discussion

This case series illustrates the heterogeneous presentations of diaphragmatic endometriosis, which may include cyclical chest pain, hemoptysis and/or hemothorax. All patients presented with right-sided diaphragmatic involvement, which is consistent with findings in the literature suggesting similar localization based on peritoneal fluid dynamics and diaphragmatic fenestrations [1,8]. Diagnosis is frequently delayed as the presenting symptoms of DE

closely resemble pulmonary or musculoskeletal disorders [7,9]. The use of imaging, particularly MRI in these cases, did assist with the diagnosis [9,15]. The surgical intervention allowed definitive diagnosis and treatment.

The thoracic endometriosis syndrome (TES) literature has documented similar patterns to what we observed in our cases, such as a high incidence of right-sided diaphragm involvement, cyclic thoracic symptoms, and extensive pelvic disease. Our patients had similar cyclical chest pain, hemopneumothorax, and pleural disease that necessitated a combination of laparoscopy and thoracoscopy, which is consistent with the management recommendations of Velagapudi and Egan [16] and Nezhat et al. [15]. In particular, the use of VATS in one case and laparoscopic full thickness diaphragm resection in the others illustrates the importance of an integrated, multidisciplinary approach to care for patients with TES. Because one patient experienced a post-operative recurrence despite pleurodesis, it is consistent with what is known about recurrence risks in TES and demonstrates the chronic and recurrent nature of diaphragm involvement [16,15,17].

Transperitoneal endometrial cell transfer via transfer of menstrual debris into the right hemidiaphragm primarily accounts for the right-sided disease predominance, given the clockwise flow patterns of peritoneal fluid. In addition to the liver acting as a physical barrier to prevent implantation from taking place within the space of the left hemidiaphragm, the clockwise peritoneal fluid flow has led to the development of several mechanisms that explain the dominance of right-sided endometriotic lesions throughout most published TES studies [16,15,17].

Fertility considerations are significant in cases involving thoracic and diaphragmatic endometriosis given the severity of pelvic disease and thus an increased risk of infertility [17]. Most of the women in this series are nulliparous, with extensive adhesions and tubo-ovarian involvement likely to have created barriers to natural conception. Although surgical excision will most likely alleviate some of the pain linked to endometriosis and allow for a higher chance of conception, early referral to fertility specialist is crucial.

Postoperative hormonal suppression (dienogest or GnRH agonists) can minimize recurrence risk [3,17] as seen in the three cases. A multidisciplinary approach is necessary to ensure effective disease management for better outcomes [17]. A significant limitation involves heterogeneity in clinical presentation and surgical procedure (laparoscopic or VATS), making it difficult to compare results directly between different cases, limiting conclusions on the most effective management approach in the long-term. Ultimately, DE should be suspected in woman with pelvic endometriosis and cyclical thoracic symptoms. Multidisciplinary surgical and medical management provides symptom relief, and long-term follow-up is important.

Conclusion

Although diaphragmatic endometriosis is a rare condition, it is an important differential for women with pelvic endometriosis and cyclic thoracic symptoms. The three cases highlight key aspects including the diagnostic challenges of diaphragmatic endometriosis, the role of imaging in diagnosis, and the need for surgical confirmation. Multidisciplinary approach- gynecologists, thoracic surgeons, and radiologists ensured optimal care for the patients. Thoracic involvement requires close working relationships between thoracic surgeons and endometriosis surgeons to provide the best evaluation, management and treatment of complications such as a pneumothorax or a hemothorax. Incorporation of thoracic experience to endometriosis referral centres should allow for improved diagnostic accuracy and surgical outcomes, and decreased morbidity in the complex patient population. The postoperative use of hormonal treatments can help with symptom control, but recurrence can occur, requiring careful follow-up care plan. Given the risk of recurrence and the complexities of surgery and management, early recognition in women with this condition is vital, as is long-term follow-up to help improve outcomes and quality of life among such women.

What is new

Diaphragmatic endometriosis is a rare manifestation, often occurring concurrent with pelvic endometriosis. This case series describes clinical variability, surgical management, and the outcomes of hormonal therapy in the postoperative management of diaphragmatic endometriosis, highlighting the need for a multidisciplinary approach.

List of Abbreviations

CT	Computed tomography
DE	Diaphragmatic Endometriosis
GnRHa	Gonadotropin-Releasing Hormone Agonist
MRI	Magnetic resonance imaging
TES	Thoracic endometriosis syndrome
VATS	Video-Assisted Thoracoscopic Surgery

Conflict of interest

All authors declare no financial and non-financial competing interests.

Funding

No funding was received from the public, commercial, or not-for-profit sector.

Consent for Publication

Written informed consent was obtained from all patients for publication of this case series and any accompanying images. Copies of the written consents are available for review by the Editor-in-Chief of this journal upon request.

Ethical approval

Ethical approval for this case series was obtained from Kenyatta University Ethics Review Committee (KUERC Ref. No.: PKU/3391/14112). Approval date: 11/11/2025.

Availability of data and material

The data supporting the findings of this case series are not publicly available due to privacy and ethical considerations.

Author contributions

All authors contributed to conception, data collection, manuscript drafting, and final approval of the submitted version.

Author details

Yamal Patel[1], Kennedy Malele[2], Joseph Santeto[3], Alin Constantin[4], Joseph Njagi[5], Charles Muriuki[5]

1. Consultant Obstetrician and Gynaecologist, Hysteroscopic and Laparoscopic Surgeon, 3rd Park Hospital, Nairobi, Kenya
2. Research and Biostatistics, 3rd Park Hospital, Nairobi, Kenya
3. 3rd Park Hospital, Nairobi, Kenya
4. Department of Gynecology, Obstetrics and Reproductive Medicine, Saarland University Hospital, Homburg, Germany
5. Consultant Obstetrician, Gynaecologist and Laparoscopic Surgeon, 3rd Park Hospital, Nairobi, Kenya

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