



EFFICACY OF DIAGNOSIS OF PELVIC ACTINOMYCOSIS ON PAP SMEAR: A TERTIARY HOSPITAL EXPERIENCE

Pathology

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ABSTRACT

Actinomyces are anaerobic gram-positive non-spore forming filamentous bacteria that are present in the normal flora of the mouth, the pharynx and probably the lower ileum and cecum. Pelvic actinomycosis is a very rare disease known to be associated with intrauterine devices (IUDs) and ascending infection from the uterus. There is a need to evaluate the prevalence of colonization with actinomycosis in women using an IUCD on pap smear. Methods: A retrospective study comprising 651 pap smear samples was conducted at our tertiary care institute in Bilaspur. Samples obtained were stained with Papanicolaou stain (Pap) and examined for actinomycosis infection. Results: Among all studied smears, actinomycosis infection was detected in 5 women, age ranging from 30-50 yrs. Three patients used IUD among 5 cases studied for actinomycosis. The studied cases depicted cytomorphological findings of Splendore-Hoeppli phenomenon and actinomycosis with LSIL having nuclear hyperchromasia, anisonucleosis, irregular and variable nuclear membranes. Conclusion: Pelvic actinomycosis associated with the use of IUDs can mimic pelvic malignancy; for that reason, diagnosis of actinomycosis can be obtained preoperatively on Papanicolaou smear. Antibiotic and surgical treatment may lead to complete resolution.

KEYWORDS

Pelvic Actinomycosis, PAP Smear, Intrauterine Device (IUD), Splendore Hoeppli Phenomenon, Cotton Ball Clusters

INTRODUCTION

Actinomycosis is a chronic bacterial infection, characterized by suppurative and granulomatous inflammation. In humans, actinomycosis is most frequently caused by *Actinomyces israelii*, an anaerobic gram-positive non-spore forming filamentous bacteria that is present in the normal flora of the mouth, the pharynx and probably the lower ileum and cecum and pelvic organs: breach in the flora leads to the infection¹. Occasionally, the clinical presentation mimics malignant pelvic tumours, tuberculosis, or nocardiosis because it spreads progressively and continuously characterized by extensive contiguous spread regardless of tissue planes². It acquires its pathogenicity through invasion of breached local tissue. There are three types of actinomycosis which are the cervicofacial, thoracic, and abdominopelvic.^{3,4}

Positivity of actinomycosis on pap smear is about 7% in women using IUD^{5,7}. Incidence of positivity depends on the type and duration of IUD used. The diagnosis can be difficult as the isolation of the organism requires prolonged bacterial cultures under anaerobic condition. Hence, PAP smear can be helpful for early detection.^{5,7}

MATERIAL AND METHODS

A retrospective analysis was performed of cases showing actinomycosis infection in IUD users on PAP smear over the past 1 year (July 2023- August 2024). A total of 5 cases were found from the total 651 PAP smears received. PAP smear slides stained by the Papanicolaou method were retrieved and reviewed. Clinical history and physical examination findings were recorded from the cytopathology registers of the Pathology Department. Patients with specially history of IUD insertion were evaluated on the basis of clinical/medical history indications (recurrent character and/or unidentified cause of chronic disease). The initial diagnosis was based on the presumptive clinical diagnosis. The final diagnosis was made after incorporating the PAP smear report. Associated cytological finding were graded as per Bethesda System^{21,22}.

Patients with positive PAP smear findings of Actinomycosis with having history of IUD insertion were included in the present review.

OBSERVATION

In the present study, five women who underwent PAP smear evaluation at the Department of Obstetrics and Gynaecology at our tertiary hospital were found positive for actinomycosis infection. The age of the patients ranged between 32 and 50 years, with the majority (90%)

belonging to the 30–50-year age group (Table 1). All patients were married.

Clinically, lower abdominal pain was the most consistent complaint, reported by all patients (100%) (Table 2). Other presenting symptoms included vaginal discharge in 40% of cases, bleeding per vagina in 20%, and itching in the genital area in 20%. A significant proportion (60%) also gave a history of unprotected sexual contact. Notably, 40% of women had a history of intrauterine device (IUD) insertion, suggesting a possible etiological association.

On cytological examination, filamentous structures with acute angle branching were observed in all cases (100%). Other hallmark features included the Splendore-Hoeppli phenomenon (40%) (Fig.1:A), cotton ball clusters (40%), and woolly bodies (40–60%). (Fig.1:B,C). Background inflammation was noted in all cases, predominantly acute (80%), with acute on chronic inflammation in 20% of smears.

Additionally, associated infections and cytological changes were documented. One case (20%) showed features of candidal infection (Fig.1:D), while another (20%) demonstrated low-grade squamous intraepithelial lesion (LSIL) characterized by nuclear enlargement, hyperchromasia, anisonucleosis, and irregular nuclear membranes (Fig.1:E). According to the Bethesda system, the majority of smears were categorized as NILM (Negative for Intraepithelial Lesion or Malignancy), with only one case showing LSIL and none showing high-grade squamous intraepithelial lesion (HSIL) or carcinoma.

Overall, these findings highlight the consistent cytomorphological features of pelvic actinomycosis on Pap smear, along with its association with IUD use, concomitant infections, and occasional premalignant change.

Table 1: Clinico-epidemiological Profile of Cervical Actinomycosis Cases

Case	Age, Sex	Testing site	Clinical symptoms	H/o of IUD Insertion	Genital examination findings	Provisional Diagnosis
1	36, F	Cervix	Pain in the lower abdomen, yellowish vaginal discharge	Absent	Cervical erosions present	Cervicitis

2	46, F	Cervix	Pain in the lower abdomen and perineal area	Absent	Bleeding per vaginum	Fibroid
3	30, F	Cervix	Pain in lower abdomen	Present	Bleeding while intercourse	PID
4.	40, F	Cervix	Burning sensation during micturition , pain in lower abdomen	Absent	Cervical erosions present	UTI with PID
5.	35,F	Cervix	Pain in the lower abdomen	Present	Vaginal discharge	PID (Candidiasis)

Table-2: Chief Complaints

Sl. No.	Complaints	No. of Cases	% of Cases
1.	Lower abdominal pain	5	100%
2.	History of unprotected sexual contact	3	60%
3.	Discharge per vaginum	2	40%
4.	H/o IUD use	2	40%
5.	Itching in genital area	1	20%
6.	Bleeding per vagina	1	20%

Table-3: BETHESDA Categorization on PAPSmear

Sl. No.	BETHESDA Category	No. of Cases	% of Cases
1.	NILM including Squamous Metaplasia	4	80%
2.	ASCUS	0	0%
3.	LSIL	1	20%
4.	HSIL	0	0%
5.	Squamous Cell Carcinoma	0	0%

Table-4: Cytomorphological Features

Sl. No.	Microscopic features	No. of Cases	% of Cases
1.	Filamentous structures with acute angle branching	5	100%
2.	Splendore Hoeffpli phenomenon	2	40%
3.	Cotton ball clusters	2	40%
4.	Woolly body	2	40%
5.	Background Inflammation - Acute - Acute on Chronic	4	80%
6.	Other associated infection (Candidiasis)	1	20%

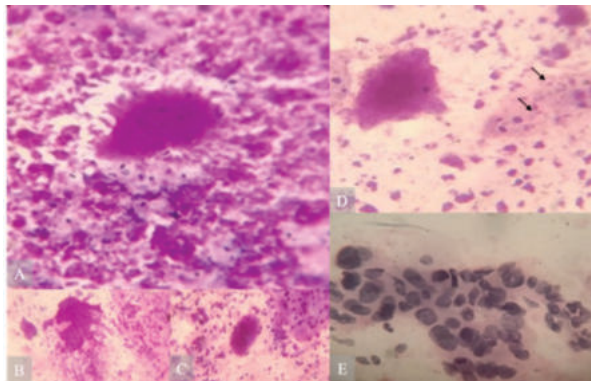


Fig.1. A. Actinomyces israelii colonies demonstrating Splendore-Hoeppli phenomenon. B. C. "Cotton ball" clusters & Woolly bodies. D. Associated Candidiasis- Candida spores (black arrows). E. Associated LSIL. Changes- anisonucleosis, nuclear enlargement & hyperchromasia, irregular and variable nuclear membranes

Fig.1. Cytomorphological Features of Cervical Actinomycosis on PAPSmear

DISCUSSION
Age Distribution

In the present study, the age of women diagnosed with pelvic actinomycosis on Pap smear ranged from 32 to 50 years, with a mean age of approximately 46 years. The majority of cases (90%) were

within the 30–50 years age group, which corresponds to the reproductive age when intrauterine device (IUD) use is most prevalent.

These findings are consistent with the study by García-García et al¹², who reviewed 39 cases of pelvic actinomycosis in Europe and reported an age distribution ranging from 18 to 65 years, with a mean of 40 years (SD 10.4) . Similarly, a systematic review of 16 clinical cases from Asia reported an age range between 25 and 86 years, with a mean age of 45.6 years (SD 15.5)¹² .

Our results are also supported by Keebler et al²³., who reported that actinomycosis infection associated with IUD use was most common in women between 30 and 45 years, reflecting the peak reproductive years and higher contraceptive device usage. Additionally, Kalaichelvan et al²⁴. observed similar findings in a Singapore cohort, where actinomyces-positive cervical smears were predominantly noted in women in their third and fourth decades of life.

Thus, the age distribution in our study aligns with existing literature, reinforcing that pelvic actinomycosis is more frequently encountered in women of reproductive age with prolonged IUD usage, a demographic that should be closely monitored during routine gynaecological screening.

Clinical Presentation

In the present study, the most common clinical symptom among women with pelvic actinomycosis was lower abdominal pain, reported in all cases. Additional complaints included vaginal discharge, bleeding per vagina, itching in the genital area, and burning micturition. A significant proportion of women also reported a history of unprotected sexual intercourse, which may act as a contributing factor.

The classical presentation of primary genital actinomycosis is characterized by chronic pelvic pain, vaginal discharge, and pelvic inflammatory disease (PID)-like symptoms, which may mimic other infectious or malignant conditions³ . Kim et al¹. similarly reported that women with actinomycosis frequently presented with abdominal pain, fever, vaginal discharge, and a history of IUD insertion, further supporting our findings. In women, infection most commonly involves the vulva and vagina, although cases affecting the cervix and perianal regions have also been documented¹.

In our study, two women had a history of IUD insertion (one Mirena and one Multiload Cu 375). The duration of IUD use ranged from 2 years to nearly 5 years. This finding aligns with the study by Kim et al¹, where 42 women were examined and 80% had IUD use, including copper IUDs and levonorgestrel-releasing systems, with durations ranging from 15 months to over 5 years.

Coinfections were also observed in our study. One case of actinomycosis was associated with low-grade squamous intraepithelial lesion (LSIL), showing characteristic nuclear enlargement, hyperchromasia, anisonucleosis, and irregular nuclear membranes. Another case demonstrated candidal infection, a finding previously noted in IUD users with actinomycosis¹⁹. Similarly, Guducu et al¹⁸. reported that bacterial vaginosis and candidiasis are often found as coexisting infections with actinomycosis, though rarely.

Overall, the clinical presentation of actinomycosis in our study corroborates existing literature, emphasizing its nonspecific symptoms that frequently mimic PID or malignancy, and its strong association with prolonged IUD use and occasional co-infections.

CONCLUSION

Pelvic actinomycosis, although uncommon, should be considered an important differential diagnosis in women presenting with chronic pelvic pain, vaginal discharge, or pelvic inflammatory disease, especially in those with a history of intrauterine contraceptive device (IUD) use^{25,26,27} . In the present study, Pap smear examination proved to be a reliable, simple, and cost-effective diagnostic tool, identifying characteristic cytomorphological features such as filamentous organisms with acute angle branching, cotton ball clusters, woolly bodies, and Splendore-Hoeppli phenomenon^{26,27} .

The findings emphasize that Pap smear is not only valuable for screening premalignant and malignant cervical lesions but also plays a crucial role in detecting rare infections like actinomycosis, which may otherwise mimic malignant or inflammatory conditions and lead to

mismanagement^{28,29}. Early recognition allows for timely medical treatment, preventing unnecessary invasive procedures and improving patient prognosis^{27,29}.

This study also highlights the association between prolonged IUD use and actinomycosis, underscoring the need for patient education regarding safe contraceptive practices, routine gynaecological check-ups, and periodic Pap smear screening^{25,27}. Further large-scale studies are warranted to better understand the prevalence, risk factors, and clinical outcomes of pelvic actinomycosis in women of reproductive age^{26,30}.

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