ARTICLE ORIGINAL / RESEARCH ARTICLE

Epidemiology and hysterosalpingogram findings in tubal infertility: results of a case series in sub-Saharan Africa’s setting

Profils épidémiologique et hystérosalpingographique d’une série de patientes souffrant d’infertilité tubaire en Afrique sub-saharienne

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Keywords: Tubal infertility, Pelvic inflammatory disease, Chronic pelvic pain, Chlamydia trachomatis, Hysterosalpingography, Endometriosis.

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RÉSUMÉ

Objectif : Décrire les profils épidémiologique et hystérosalpingographique d’une série de patientes suivies pour infertilité tubaire à l’Hôpital Général de Douala.

Méthodologie : Il s’agissait d’une étude descriptive réalisée dans les services de gynécologie et d’Imagerie médicale de l’Hôpital Général de Douala (HGD), du 1er octobre 2016 au 30 juillet 2017. Étaient incluses toutes les femmes suivies pour infertilité tubaire diagnostiquée à l’hystérosalpingographie (HSG). Les paramètres retenus étaient : l’âge, le statut matrimonial, le niveau d’étude, la profession, le type d’infertilité, la durée de l’infertilité, les manifestations cliniques, le bilan infectieux et les lésions trouvées à l’HSG. Les données étaient analysées par le logiciel SPSS version 20.0 dans le respect de la l’anonymat et de la confidentialité.

Résultats : Soixante-dix-sept patientes étaient retenues dans notre étude. L’âge moyen était de 30,6±5,07 ans (extrêmes 21ans - 44 ans). L’infertilité secondaire était prédominante, 61% (47 patientes) ; La durée moyenne de l’infertilité était de 6,85± 4,5 ans (extrême 1an – 18 ans). 22.1% avaient un antécédent de maladie inflammatoire pelvienne chronique. 88.5% étaient symptomatiques avec pour principales manifestations cliniques : la pelvialgie chronique (44,2%) et la dyspareunie profonde (33,7%). Les principaux germes isolés étaient : Chlamydia trachomatis (51.9 %), Ureaplasma urealyticum (15.58 %) et Mycoplasma hominis (10.3%). Les lésions trouvées à l’hystérosalpingographie étaient : les adhérences pelviennes (28,1%), les obstructions tubaires proximales bilatérales (13,2%), les phimosis tubaires (12,4%), les hydrosalpinx (12,4%), les obstructions tubaires distales unilatérales (11,6%), les obstructions tubaires proximales unilatérales (8,3%), les obstructions tubaires distales bilatérales (8,3%) et l’endométrie tubaire (9%).

Conclusion : Notre population d’étude est à risque de maladie inflammatoire pelvienne chronique. Les lésions tubaires et les adhérences, suggestives de séquelles de maladie...
Infertility is the inability for a woman not on contraceptive to obtain a clinical pregnancy after normal sexual activity over a period of at least 1 year [1]. When it is of tubal origin it is termed tubal infertility. Infertility of tubal origin is a public health problem in Sub-Saharan Africa and particularly in Cameroon [2, 3, 4]. With Hysterosalpingography being a diagnostic tool of tubal lesion, we therefore sought to establish the epidemiologic and radiological profile of patients suffering from tubal infertility in our setting. This will consequently contribute to a better understanding and adequate management of tubal infertility.

2. Materials and Methods
We carried out a prospective study over a period of 10 months from 1st of October to 30 th of July 2017. It was conducted in the departments of gynecology and radiology of the Douala General hospital. DGH is a situated in Douala, Cameroon, and serves as a referal hospital for the country. The department of Gynecology is managed by 6 gynaecologists and the department of radiology by 3 radiologists. Patients are consulted by the gynecologist who refers them to the radiologist for HSG once indication is made. We included all women suffering from infertility and whose HSG results showed tubal lesions. All other causes of infertility were excluded and spermogram of the partners were normal.

Women who were diagnosed of infertility were administered pre-designed questionnaires consisting of socio-demographic information (age, matrimonial status, level of education and occupation) and clinical information (type of infertility, duration of infertility, clinical manifestations, infectious screen and lesion found during hysterosalpingography).

The HSG were performed on out-patient basis from the 7th to the 10th day of menstrual cycle. It was done with a controlled x-ray machine having a televised scope. The canulars for hysterosalpingography were used for catherisation of the cervix. X-ray photographs were taken at the instant when the uterine cavity was filled with a water soluble contrast medium and when an overflow was seen at both sides of the tube, or when maximal filling of the tubes was observed without any overflow. After 30 minutes a late film was made to assess the contrast material diffusion.

All the HSG were done at the DGH. In order to avoid inter-observer bias all the reports were validated by the team of radiologist at the department of radiology.
Ethical approval was obtained from ethics committee of the DGH. We also obtained informed consent from each participant before inclusion into the study.

Data was analyzed using SPSS version 20.0. Categorical variables were summarized as frequencies and percentages. Continuous variables were presented as mean and standard deviation.

3. Results
3.1 Epidemiologic profiles (Table I)

A total of 77 patients were included in our study. The mean age of the participants was 30 ± 5.07 years. Almost half of the study participants were married with most (48.1%) being monogamous marriages. All of the study participants were educated with majority of them having a secondary level of education (53.2%) and working with public and private institutions (59.8%) ending a salary monthly. Of the 77 participants, 38.9% (30 patients) were suffering from primary infertility, and 61% (47 patients) were suffering from secondary infertility. The mean duration of infertility was 6 ± 4.5 years. 22.1% had a past history chronic pelvic inflammatory disease. Most of the participants were symptomatic (88.5%) with the frequent clinical manifestations being: chronic pelvic pain (44.2%) and deep dyspareunia (33.7%). (Table I).

Table I: Epidemiologic profile of participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[15-25]</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>[25-35]</td>
<td>55</td>
<td>71.4</td>
</tr>
<tr>
<td>[35-45]</td>
<td>21</td>
<td>27.3</td>
</tr>
<tr>
<td>Matrimonial status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monogamy</td>
<td>37</td>
<td>48.1</td>
</tr>
<tr>
<td>Polygamy</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>Single</td>
<td>24</td>
<td>31.2</td>
</tr>
<tr>
<td>Co-habiting</td>
<td>14</td>
<td>18.2</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>28</td>
<td>36.4</td>
</tr>
<tr>
<td>Secondary</td>
<td>41</td>
<td>53.2</td>
</tr>
<tr>
<td>Tertiary</td>
<td>8</td>
<td>10.4</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil servant</td>
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<td>37.7</td>
</tr>
<tr>
<td>Private sector</td>
<td>14</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Past history of chronic pelvic inflammatory disease

<table>
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<tr>
<th>Clinical presentation</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic pelvic pain</td>
<td>34</td>
<td>44.2</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>28</td>
<td>33.7</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>15</td>
<td>19.5</td>
</tr>
</tbody>
</table>

Pathogen isolated

<table>
<thead>
<tr>
<th>Pathogen isolated</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia trachomatis</td>
<td>40</td>
<td>51.9</td>
</tr>
<tr>
<td>Ureaplasma urealyticum</td>
<td>12</td>
<td>15.6</td>
</tr>
<tr>
<td>Mycoplasma hominis</td>
<td>8</td>
<td>10.3</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>4</td>
<td>5.1</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>4</td>
<td>5.1</td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

The principal pathogens isolated were: Chlamydia trachomatis 51.9 %, Ureaplasma urealyticum 15.58 % and Mycoplasma hominis 10.3%, Staphylococcus aureus 5.1 %, Escherichia coli 5.1 % and Klebsiella pneumoniae 3.8 % (Figure 1).

Figure 1: Findings of hysterosalpingography
3.2 Hysterosalpingogram findings

Findings on HSG were: pelvic adhesions (44.1%), unilateral proximal tubal obstruction (12.9%), bilateral proximal tubal obstruction (20.7%), unilateral distal tubal obstruction (18.1%), bilateral distal tubal obstruction (12.9 %), tubal phimosis (19.4 %), hydrosalpinx (19.4%), unilateral nodular isthmic salpingopathies (tuba-erecta) : 2.5 %, bilateral nodular isthmic salpingopathies (3.8 %) and endosalpingiosis : « boule de Gui » 2.5 % (2 patients). (Figures 2)

- Pelvic adhesions
- Bilateral proximal tubal obstruction
- Tubal phimosis
- Hydrosalpinx
- Unilateral distal tubal obstruction
- Endosalpingiosis
- Bilateral tube erecta
- Unilateral proximal tubal obstruction
- Bilateral distal tubal obstruction

**Figure 2.1**: Findings of hysterosalpingography

**Figure 2.2**: Findings of hysterosalpingography. A: Bilateral tubal phimosis. B: Bilateral tube erecta. C: Pelvic adhesions. D: Bilateral hydrosalpinx. E: Bilateral proximal tubal obstruction.
**4. Discussion**

We have shown in our study that the mean age of infertility is 30.6 ± 5.06 yrs. Secondary infertility was the most frequent type of infertility. Lesions found on hysterosalpingography were: pelvic adhesions (28%, 13.2%), bilateral proximal tubal obstructions (13.2%), tubal phimoses (12.4%), hydrosalpinx (12.4%), unilateral distal tubal obstruction (11.6%), unilateral proximal tubal obstruction (8.3%), bilateral distal tubal obstruction (8.3%) and tubal endometriosis (9%).

The mean age of infertility (30.6 ± 5.06 years) in our study is similar to that observed by several authors [4,5,6]. Among study participants, 48% of the involved in monogamous marriages. This finding is contrary to what Nana et al found out in their study in Cameroon in 2011 where co-habiting was the most frequent type of marital status among infertile women [5]. If it is true that being free in a relationship could encourage having multiple sexual partners, and therefore explain its impact on infertility, our results therefore show that even in monogamous marriages, having multiple sexual partners can not be excluded. Maral et al also had contrary results in their study. They found out that students were at risk of sexually transmissible infections and therefore tubal infertility [7].

Secondary infertility was the most frequent type of infertility (61%). This is almost similar to that observed Belley et al (57.3%) in Cameroon [3], as well as other authors in other Sub-Saharan countries [8, 9]. The duration of infertility is however longer in study as compared to that recorded by Nana et al (4.70 ± 3.58 years) in Cameroon [5]. This could be explained by either late or inadequate management due to self-medication, late consultation, asymptomatic chronic pelvic disease, low purchasing power due to high price of drugs and laboratory results, treatment of traditional doctors thereby exposing women to sequelae [10, 11, 12].

Past history of pelvic inflammatory disease has been reported to be a risk factor of tubal infertility [13,14]. In our study 22% of the participants had a past history of pelvic inflammatory disease. This relationship had been attributed to immuno-inflammatory phenomena which could lead to tubal fibro-sclerosis and irreversible pelvic adhesions [13,14].

The most frequent clinical signs observed were chronic pelvic pain (44.2%) and deep dyspareunia (33.7%). This finding is almost similar to what Kemfang et al had in Cameroon where 55.8% of study population had chronic pelvic pain [15]. These pains may occur in cases of injury to the upper genital tract as seen in pelvic inflammatory disease and endometriosis which may therefore explain their presence in tubal infertility [16]. In a study carried out by Nana Njamen et al, upto 97.5% (39 out of 40) of the participants suffering from CPP had organic lesions on laparoscopy [10, 15]. Deep dyspareunia just as chronic pelvic pain may reflect injury to the genital tract. Njamen et al found out in a study carried in Cameroon that 47.5% of patients suffering from chronic pelvic pain also complained of deep dyspareunia [12]. In another case study carried by He et al, it was observed that patients with deep dyspareunia were 2 times more likely to be infertile [13].

The percentage of asymptomatic patients (19.5%) in our study was lower than that recorded by Njamen and collaborators (28.9%) in their series of 636 patients suffering from sexually transmissible infection [12]. This difference could be due their larger sample size which was 7 times larger than ours. Many authors have reported Chlamydia trachomatis as the most frequent pathogen isolated in infertile patients [12, 15]. We also recorded a similar finding in our study, as the pathogen was isolated in upto 51.9% of the women. This finding is to be taken into consideration in our context where clinical manifestations can be very frustrating.

Lesions found on hysterosalpingography were: pelvic adhesions (28%, 1%), bilateral proximal tubal obstructions (13.2%), tubal phimosis (12.4%), hydrosalpinx (12.4%), unilateral distal tubal obstruction (11.6%), unilateral proximal tubal obstruction (8.3%), bilateral distal tubal obstruction (8.3%) and tubal endometriosis (9%). Belley et al in their study carried out in Cameroon in 2015 recorded essentially pelvic adhesions (22.8%), BPTO (16.2%), tubal phimosis (6.8%) [3]. This is similar to study carried out by Bako et al in Nigeria where pelvic adhesions (19.23%) was also the most frequent finding followed by hydrosalpinx (22.1%) and bilateral tubal obstruction (10 %) [17]. This was however contrary to study carried out by Gandji et al in Benin in 2013 bilateral tubal obstruction as the most frequent finding, observed in 19% of their cases [6].

In our series, tubal endometriosis was observed in 9% of patients. This finding is contrary to other studies carried out in our context where tubal endometriosis was not seen on HSG in any of the participants [3, 4, 6]. Endometriosis might have a negative effect on fertility: peritoneal diffusion by retrograde transport of endometrial cells via the fallopian tubes and metaplasia of peritoneum are the proposed mechanisms. The resultant inflammation causes tubal obstruction thereby preventing fertilisation [18-19].
In our series, unilateral obstruction was recorded in 19.9% of the study participants who we expected to become pregnant because the spermogramme of their partners were normal. Studies have reported the rate of false positives at 13 to 30% and that of false negatives at 8 to 35% on HSG [20,21]. Therefore, predictive value of tubal obstruction on HSG is not 100%. However in cases of pelvic peritoneal endometriosis not detectable on HSG, it is possible to observe infertility though fallopian tubes are not obstructed. Several mechanisms have been proposed concerning how pelvic peritoneal endometriosis adversely impacts fertility. Firstly, sperm quality or function is decreased and this has been attributed to inflammatory/toxic effects of the peritoneal fluid and increased activated macrophages [22]. The increased number of inflammatory cells in the peritoneal fluid not only damage the oocytes and sperm, but has also been shown to have toxic effects on the embryo [23]. In addition, studies have shown aberrant expression of glutathione peroxidase and catalase in the endometrium of patients with endometriosis and it can be suspected that there is also an increase in endometrial free radicals and subsequently a negative effect on embryo viability [24-25]. This emphasis the role of laparoscopy which permits to determine with certainty tubal patency and also eliminates the presence of peritoneal endometriosis. However, laparoscopy also contributes effectively in evaluating the prognosis of fertility which permits early and adequate management. This will consequently decrease the duration of infertility which could be very worrisome in cases with advanced age.

5. Conclusion
The epidemiologic profile of our study population showed that they are at risk of having pelvic inflammatory disease. The radiologic profile revealed mainly tubal lesions and pelvic adhesions suggestive of sequelae from pelvic inflammatory disease. Consequently, the cases of tubal patency observed reminds us of the role of endoscopy which permits confirmation of diagnosis.

6. Références


