Advances in Contraception 7 (1991) 333–338

ESC Meeting

Intrauterine devices in nulliparous women

K.R. PETERSEN, L. BROOKS, B. JACOBSEN and S.O. SKOUBY

Department of Obstetrics and Gynecology, Herlev University Hospital, 2730 Herlev and Department of Obstetrics and Gynecology, Rigshospitalet, 2100 Copenhagen, Denmark

Abstract

The majority of studies on the clinical events following the insertion of an intrauterine device for contraception have observed a higher frequency of adverse effects in nulliparous women. In this review, the significance of nulliparity on the occurrence of medical removal for bleeding and pain, expulsion and pelvic inflammatory disease is estimated. The possible role of the anatomy of the pregravid uterus is discussed, and results obtained through a selective measurement of the endometrial cavity in a population of nulligravidas is presented.

It is concluded that IUDs should not be the first choice of contraception in nulliparous women because of an increased risk of long-term adverse effects. The relationship between the length of the intrauterine device and the length of the endometrial cavity does not seem to be of clinical significance for the performance of IUDs in nulliparous women.

Introduction

When young nulliparous women seek contraceptive advice, certain considerations must obviously be taken. First, an effective contraceptive method is essential, as an unwanted pregnancy may have negative social implications for the woman and induced abortion as an alternative to effective contraception is, for medical, psychological and ethical reasons, unacceptable. On the other hand, even minor side-effects reduce the effectiveness of a contraceptive method, as the compliance of these women is often rather low. Moreover, special attention must be paid to the possible long-term effects of a given contraceptive, as impairment of general or reproductive health due to the use of contraception is unacceptable.

The use of intrauterine devices (IUDs) in nulliparous women is usually discouraged because of the increased frequency of side-effects, primarily pelvic

inflammatory disease (PID) observed in these women [1,2]. IUDs must, however, be considered in nulliparous women who have medical contraindications to hormonal contraception and in those who are unable to deal with barrier methods.

This short review discusses the most common side-effects of intrauterine contraception with special reference to nulliparity.

Expulsion

Expulsion of the IUD from the uterus tends to be more frequent in nulliparous women and expulsion rates of 0.5–17 have been reported [3,4]. Reducing the number of expulsions will significantly increase the continuation rate in nulliparous women, as most studies report this event to be one of the most frequent causes for stopping the use of IUD. Some of the important factors influencing the expulsion rate are mentioned below.

The time of insertion seems to be of significance, as the lowest expulsion rate has been observed after mid-cycle (day 11–17) insertions, probably due to the quiescent state of the myometrium at this time of the cycle [5]. Initial fundal placement of the IUD also tends to reduce the tendency to expel the device [6]. The relationship between the size of the device and the dimensions of the uterus does, however, seem to be of special importance for the expulsion rate [7]. If a disproportion between the device and the uterus is present, myometrial distension and endometrial compression causing increased tendency to expulsion and increased frequency of spotting might be expected. In this respect, the length of the endometrial cavity seems to be of particular significance [8]. As the cervix to corpus ratio shows considerable variation, the endometrial length cannot readily be estimated from the total axial length of uterus obtained by conventional sounding, and a special instrument, the Wing Sound, has to be used [9]. Using this sound in a population of nulliparous women, Hasson *et al.* observed a frequency of expulsions and medical removals of more than 60% when the length of the IUD equalled or exceeded that of the endometrial cavity [8]. The lowest event rate (9.1%) was noted when the endometrial cavity was 1.25–1.75 longer than the IUD.

These results suggest that knowledge of the length of the endometrial cavity might enable the clinician to select more accurately the correct device for any individual women. In a recent study [10], we failed to confirm the clinical significance of the relationship between the length of the endometrial cavity and the length of the IUDs reported by Hasson *et al.*. Our study included 236 nulligravidas who were observed for 12 months. A median value of endometrial length of 31 mm was noted, which is in accordance with the corresponding figure of 28 mm observed by Hasson in white nulliparous women [9]. The lengths of the IUDs used in our study varied between 25 and 36 mm and in 52% of the women the length of the IUD inserted equalled or exceeded that of the endometrial cavity. Although the expulsion rate in this group was higher (13.2%), it did not differ significantly from the corresponding rate of 7.2% in women who had an endometrial cavity longer than the IUD inserted.

Our figures are not able to support the assumption that the expulsion rate in nulliparous women can be reduced if a certain relationship between the length of the IUD and that of the endometrial cavity is obtained.

Medical removal for bleeding and pain

Uterine bleeding, spotting and cramping are the most common side-effects of intrauterine contraception and these complaints seem to occur with increased frequency in nulliparous women [3,19]. The medical importance of increased menstrual blood loss in IUD users living in the developed countries is still questioned [6], but, in a report from Kivijarvi *et al.* [11], clinical anemia was noted in 10% of users of copper IUDs after 12 months of observation and iron deficiency, as judged by the ferritin level, could be demonstrated in 20%.

In attempts to reduce the frequency and severity of these side-effects, numerous agents, such as antifibrinolytics, prostaglandin synthetase inhibitors, hormones, antihistamines and vasoconstrictors have been used. None of these agents have, however, been found to be consistently successful [12].

Progesterone IUDs have, however, been shown to reduce the amount of menstrual flow [13], but so far only one hormone releasing device (the Progestasert) is commercially available. Other devices are currently under evaluation.

In the previously quoted study by Hasson *et al.* [8], the frequency of medical removal because of bleeding and pain was higher in women with an endometrial cavity equal to or shorter than the IUD inserted. In our study of the IUD/endometrial cavity relationship a similar tendency was observed. When the IUD was equal to or longer than the endometrial cavity, 14.2% of the women experienced bleeding and pain requiring removal of the device. When the opposite relationship was present the removal rate was 9.0%. This difference is, however, not statistically significant, and the results indicate that the IUD/endometrial cavity relationship is of no major relevance for the occurrence of bleeding and pain in nulligravids.

Pelvic inflammatory disease

The most serious and controversial issue surrounding the use of IUDs is the possible relationship to the development of PID. This problem has been assessed in a number of studies and, despite major methodological differences (reviewed in [14]), a consistent increase in PID seems to exist in IUD users. Relative risks between 1.8 and 9.3 have been reported [15,16]. The magnitude of the increase is influenced by the control group used, as the risk seems to be higher, when controls are women using no contraception rather than women using other contraceptive methods. This result possibly reflects the protective effect of oral contraceptives and barrier methods.

Two case–control studies from the seventies showed that the risk of developing PID was significantly greater in nulliparous IUD users when compared with multiparous [2,17]. A number of later studies have, however, failed to confirm the

significance of nulliparity and have pointed to age as the more important factor [18,19]. The finding of younger nulliparous IUD users being at greater risk of developing PID than older ones of corresponding parity [20] probably reflects the association between young age and PID found in the general population [21].

The number of sexual partners does, however, seem to be the most important risk factor for developing PID. When compared with single-partner IUD users, those with multiple partners are at greater risk, and the risk seems to increase further if the partners have multiple partners [22,23]. The increased risk of developing PID initially observed among nulliparous IUD users, the majority of whom will coincidentally belong to the younger age group might be due to a tendency to have multiple sexual partners among younger women.

Infertility due to tubal occlusion is considered the most serious long-term effect of PID. Weström [24] reported an infertility rate of 21.2% through 9.5 years of follow-up in 415 women with laparoscopically verified salpingitis, and a progressive rise in tubal occlusion from 12.5% after one infection to 75% after 3 or more attacks were noted. In salpingitis-free controls, only 3% were unable to conceive.

The possibility that IUD-related PID might have a less pronounced influence on future fertility than cases with other etiology has been considered recently [25,26]. In these studies, the risk of tubal infertility in ever-users of IUDs was 2.0–2.6 times that found in women who had never used an IUD. Again, the effect of sexual practice was stressed, as single-partner women had no increased risk of tubal infertility associated with IUD use. Although the criteria for PID in these studies were different from Weström's, the studies do not support the assumption that IUD-related PID should have a particularly benign course.

In the study mentioned above, 9% of nulligravid IUD users had the IUD removed because of clinical suspicion of PID. No difference between women with an IUD equal to or longer than the endometrial cavity and women with an IUD shorter than the cavity was noted (removal rates of 10.9% and 8.3%, respectively).

Conclusion

Nulliparity must still be considered the most important relative contraindication for intrauterine contraception. Insertion of an IUD in a nulliparous woman can, however, be considered, if she is not in a category at risk of developing PID, i.e. if there is no history of previous PID and if she has only a single sexual partner. If these factors cannot be established the use of IUDs should be avoided.

In nulliparous women who do use an IUD, the continuation rate is often disappointing. It is to be hoped that future development of improved IUD designs and medications will be able to ensure a reduction in the frequency of expulsion and medical removal because of bleeding and pain, which accounts for the majority of terminations. Our study of the clinical significance of the relationship between the length of the IUD and the length of the endometrial cavity failed to confirm earlier reports of lower complication rates in nulliparous women whose endometrial cavity was longer than the IUD inserted. Accordingly, measurement of the length of the

endometrial cavity does not seem to be of benefit to the clinician when selecting the correct device for the individual woman.

References

1. Editorial (1978). The nulliparous patient, the IUD and subsequent fertility. *Br. Med. J.*, **2**, 233
2. Weström, L., Bengtson, L.P. and Mårdh, P. (1976). The risk of pelvic inflammatory disease in women using intrauterine contraceptive devices as compared to non-users. *Lancet*, **2**, 221–224
3. Liedholm, P. and Sjöberg, N.O. (1974). Two years experience with Copper-T-200 in a Swedish population – a comparison between nulliparous and parous women. *Contraception*, **10**, 55–61
4. Kulig, J.W., Ruah, J.L., Burket, R.L., Cabot, H.M. and Brookman, R.R. (1980). Experience with the Copper-7 intrauterine device in an adolescent population. *J. Pediatr.*, **96**, 746–750
5. White, M.K., Ory, H.W., Rook, J.B. and Rochat, R.W. (1980). Intrauterine device termination rates and the menstrual cycle day of insertion. *Obstet. Gynecol.*, **55**, 220–224
6. Tatum, H.J. and Connell, B.C. (1986). A decade of intrauterine contraception: 1976 to 1986. *Fertil. Steril.*, **46**, 173–191
7. Kamal, I., Hefnawi, F., Ghonheim, M., Talant, M. and Abdalla, M. (1971). Dimensional and architectual disproportion between the intrauterine device and the uterine cavity: a cause of bleeding. *Fertil. Steril.*, **22**, 514–521
8. Hasson, H.M., Berger, G.S. and Edelmann, D.A. (1976). Factors affecting intrauterine contraceptive device performance. 1. Endometrial cavity length. *Am. J. Obstet. Gynecol.*, **126**, 973–981
9. Hasson, H.M. (1974). Differential uterine measurements recorded in vivo. *Obstet. Gynecol.*, **43**, 400–412
10. Petersen, K.R., Brooks, L., Jacobsen, B. and Skouby, S.O. Clinical performance of intrauterine devices in nulligravids: is the length of the endometrial cavity of significance? *Acta Eur. Fertil.* [in press]
11. Kivijarvi, A., Timoneb, H., Rajamaki, A. and Gronroos, M. (1986). Iron deficiency in women using copper intrauterine devices. *Obstet. Gynecol.*, **67**, 95–98
12. Tatum, J.T. and Connell, E.B. (1989). Intrauterine contraceptive devices. In: *Contraception. Science and Practice*, Filsie, M. and Guillebaud, J., eds., Butterworth & Co., London, pp. 347–365
13. Bonnar, J. and Sheppard, B.L. (1979). Endometrial changes in women using hormone releasing intrauterine devices. In: *Endometrial Bleeding and Steroidal Contraception*, Diczfalusy, E., Fraser, I.S. and Webb, S.T.G., eds., Pitham Press, Bath, pp. 347–365
14. Senanagake, P. and Kramer, D. (1980). Contraception and the etiology of pelvic inflammatory disease: New perspectives. *Am. J. Obstet. Gynecol.*, **138**, 852–860
15. Noonan, A.S. and Adams, J.B. (1974). Gonorrhoea screening in an urban hospital family planning program. *Am. J. Public Health*, **64**, 701–704
16. Targum, S.D. and Wright, N.H. (1974). Association of the intrauterine device and pelvic inflammatory disease: a retrospective pilot study. *Am. J. Epidemiol.*, **100**, 262–271
17. Escenbach, D.A., Harnisch, J.P. and Holmes, J.K. (1977). Pathogenesis of acute pelvic inflammatory disease: role of contraception and other risk factors. *Am. J. Obstet. Gynecol.*, **128**, 838–850
18. Osser, S., Gullberg, B., Liedholm, P. and Sjöberg, N.O. (1978). Is development of pelvic inflammatory disease in women using intrauterine device regardless of parity? A one-year follow-up study. *Contraception*, **17**, 563–567
19. Luukainen, T., Allonen, H., Nielsen, N.C., Nygren, K.G. and Pyörälä, T. (1983). Five years experience of intrauterine contraception with the Nova-T and the Copper-T-200. *Am. J. Obstet. Gynecol.*, **147**, 885–892
20. Booth, M., Beral, V. and Guillebaud, J. (1980). Effect of age on pelvic inflammatory disease in nulliparous women using a Copper-T intrauterine contraceptive device. *Br. Med. J.*, **2**, 114
21. Weström, L. (1980). Incidence, prevalence and trends of acute pelvic inflammatory disease and its consequences in industrialized countries. *Am. J. Obstet. Gynecol.*, **138**, 880–892
22. Lee, N.C., Rubin, G.L. and Borucki, R. (1988). The intrauterine device and pelvic inflammatory disease revisited: new results from the Womens Health Study. *Obstet. Gynecol.*, **72**, 1–6
23. Tatum, H.J. and Connell, E.B. (1985). Managing patients with intrauterine devices. 1st Edition. Durant, Creative Informations Inc
24. Weström, L. (1975). Effect of pelvic inflammatory disease on fertility. *Am. J. Obstet. Gynecol.*, **121**, 707–713

25. Cramer, D.W., Schiff, I., Schoenbaum, S.C. *et al.* (1985). Tubal infertility and the intrauterine device. *N. Engl. J. Med.*, **312**, 941–947
26. Daling, J.R., Weiss, N.S., Metch, B.J. *et al.* (1985). Primary tubal infertility in relation to the use of an intrauterine device. *N. Engl. J. Med.*, **312**, 937–941

MS received 5 Dec. 90.
Accepted for publication 5 Apr. 91.

Resumé

La majorité des études sur les événements cliniques faisant suite à l'insertion d'un dispositif contraceptif intra-utérin ont fait état d'une fréquence plus élevée d'effets contraires chez les femmes nullipares. La présente étude examine l'incidence de la nulliparité sur le retrait effectué pour des raisons médicales telles que des saignements et des douleurs, l'expulsion et des maladies pelviennes inflammatoires. Elle examine le rôle possible de l'anatomie de l'utérus prégravide et présente les résultats obtenus lors de mensurations sélectives de la cavité endométriale dans une population de nullipares.

L'étude conclut que les dispositifs intra-utérins ne devraient pas constituer le premier choix de contraception pour les femmes nullipares en raison du risque accru d'effets défavorables à long terme. Le rapport entre la longueur du dispositif et la longueur de la cavité endométriale ne semble pas avoir d'importance du point de vue clinique sur l'efficacité des DIU chez les femmes nullipares.

Resumen

La mayoría de los estudios sobre acontecimientos clínicos tras la inserción de un dispositivo anticonceptivo intrauterino han observado una frecuencia más alta de efectos desfavorables en las mujeres nulíparas. En el presente estudio se examina la incidencia de la nuliparidad sobre el retiro efectuado por razones médicas, como pérdidas y dolores, expulsión y enfermedades pélvicas inflamatorias. Se examina el posible papel de la anatomía del útero pregrávido y se presentan los resultados obtenidos mediante la medición selectiva de la cavidad del endometrio en una población de nulíparas.

Se llega a la conclusión de que los dispositivos intrauterinos no deberían constituir la primera elección de anticonceptivo para las mujeres nulíparas por el mayor riesgo de efectos desfavorables a largo plazo. La relación entre la longitud del dispositivo y la longitud de la cavidad del endometrio no parece tener importancia clínica en cuanto a la eficacia de los DIU en las mujeres nulíparas.