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New Product Review (October 2004)

FemCap

FemCap is a silicone rubber vaginal barrier contraceptive device. A large, randomised, multicentre study failed to demonstrate clinical equivalence of FemCap with a traditional diaphragm (Ortho All-Flex), with the adjusted risk of pregnancy among FemCap users being 1.96 times that among diaphragm users.

In this study:

- The six-month Kaplan-Meier cumulative, unadjusted, typical-use probability of pregnancy was 13.5% for FemCap users, and 7.9% for diaphragm users (both devices used with spermicide).
- The adjusted risk of pregnancy for FemCap users was 1.96 times that for diaphragm users with an upper 95% confidence limit of 3.01.
- The investigators' pre-set criterion for clinical equivalence required that FemCap users had no more than 1.73 times the pregnancy risk of diaphragm users. Thus, the trial did not demonstrate clinical equivalence and suggested that FemCap is less effective than the conventional diaphragm.
- No statistically significant interaction was found in relation to efficacy between device and parity, age or history of previous barrier method use.
- Cervical smears performed on both groups initially, at 12-week follow-up, and at discontinuation showed no statistically significant differences in atypical squamous or glandular cells, or in low-grade squamous intraepithelial lesions.
- FemCap users were less likely than diaphragm users to develop urinary tract infection (Odds ratio, 0.6; 95% CI, 0.4-1.0).
- FemCap users were more likely than diaphragm users to report the presence of blood at device removal (Odds ratio, 2.3; 95% CI, 1.3-4.1).
- FemCap users were more likely than diaphragm users to report device dislodgement (Odds ratio 5.5; 95% CI 3.7-8.0)
- FemCap users were more likely than diaphragm users to report difficulty removing the device (Odds ratio 3.1; 95% CI, 1.8-5.4)

Background

This New Product Review examines available evidence on FemCap. This evidence comprises a small phase I study,¹ and a large phase II/III randomised multicentre study² which included a small nested study on colposcopic appearances of the cervix. Two unpublished studies have looked at the safety and acceptability of a 'second generation' FemCap (with a removal strap).³

Barrier methods such as condoms, diaphragms and cervical caps are the only methods of contraception that protect, albeit with variable success, against sexually transmitted infections (STIs) as well as pregnancy.⁴ Reported failure rates for diaphragms and cervical caps vary.⁵ With typical use, if a woman has had no previous births and uses any cervical cap with spermicide for one year, the rate of pregnancy is estimated to be 20%, and this increases to 40% for women with previous births.⁶

What is FemCap?

FemCap (FemCap Inc. USA) is a vaginal barrier contraceptive device available from Family Planning Sales Ltd, UK. A pack containing a single device costs £12.95. A free step-by-step video and reference guide for users is sent with the pack on request. FemCap was designed to conform to the anatomy of the cervix and to take advantage of the physiology of the vagina.⁷ This design was expected to be easier to fit, to result in fewer dislodgements, and to exert less pressure on the cervix, vaginal walls and urethra - thus reducing the likelihood of urinary tract infection (UTI).²

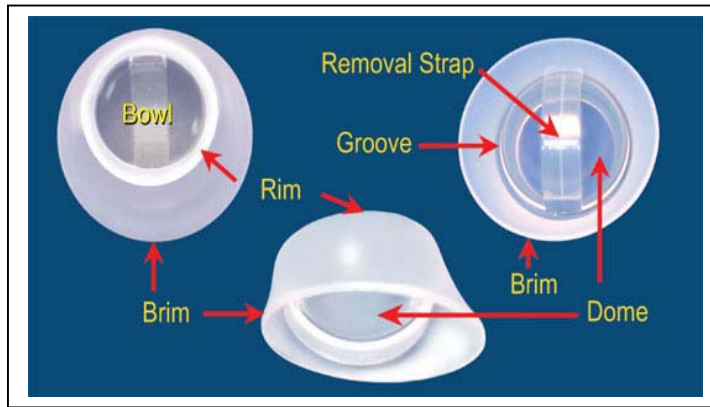


Figure 1: FemCap. Figure Courtesy of FemCap Inc.

The device is shaped like an American sailor's hat and made of soft hypoallergenic medical grade silicone rubber. It comprises a dome which covers the cervix and a circular brim, which fits into the fornices covering the vaginal vault.⁷ The posterior brim adheres to the vaginal walls and is designed to funnel ejaculatory fluids into a groove between the dome and the brim, which also acts as a reservoir for spermicide.⁷ The device is available in three diameters, and women considering use of FemCap should, ideally, consult an appropriate health professional to determine the correct device size. The smallest diameter (22mm) is recommended for nulliparous women, the medium size (26mm) for parous women who have not had a vaginal delivery, and the largest size (30mm) for parous women who have had at least one vaginal delivery.⁷ The 'second generation' FemCap has a strap for ease of removal, and a higher brim in the medium and large sizes.

Spermicide

A systematic review on contraceptive efficacy of a diaphragm alone versus diaphragm with spermicide concluded that there was insufficient evidence to justify changing the recommendation that diaphragms should be used with spermicide.⁸ Use of spermicide with FemCap is recommended.⁹ A phase I study of eight women assessed the number of progressively motile sperm in mid-cycle cervical mucus after coitus when FemCap was used with and without spermicide.¹ This study found that FemCap used with either spermicide or a non-spermicidal lubricant was comparable in this respect to a conventional diaphragm used with spermicide.

All spermicides in the UK contain nonoxinol-9 (N-9).¹⁰ The World Health Organisation (WHO) Department of Reproductive Health Research has produced a report on the safety and effectiveness of N-9, in preventing pregnancy and STIs, in conjunction with the Contraceptive Research and Development Program (CONRAD), USA.¹¹ This report concluded that N-9 has been shown to cause epithelial disruption in the vagina, particularly with high frequency of use, and should not be used for the prevention of human immunodeficiency virus (HIV) or other STIs, by women who have multiple daily acts of intercourse or those at high risk of HIV infection.

Insertion

The manufacturers advise that FemCap should not be used during menstruation, as they believe it may impede the natural flow of menstrual fluid.⁹ To lower the risk of infection, the manufacturers advise women to urinate and defecate, and then wash the genital and rectal areas and hands before insertion. FemCap should be inserted from 15 minutes to 42 hours before intercourse. Spermicide should be applied into the bowl of the device, and spread in a thin layer over the outer brim and also applied into the groove between the brim and the dome. The flattened device is inserted into the vagina brim first, with the bowl facing upward, and pushed in to cover the cervix completely. For further acts of intercourse, women are advised to check the position of the device and insert additional spermicide without removal.⁹

Removal

FemCap must be left in place for at least six hours after the last act of intercourse, but can remain *in situ* for up to 48 hours.⁹ Breaking the suction between the dome of the cap and the cervix by applying pressure against the dome allows the device to be gently pulled down and out of the vagina. FemCap should then be washed, preferably with warm, soapy water, dried and stored in the container provided. The device must be replaced every two years, or sooner if there are signs of wear.⁹

Contraindications

The WHO *Medical Eligibility Criteria for Contraceptive Use* (WHOMECEC) advises that the cervical cap is unsuitable for use until six weeks postpartum, or six weeks after second-trimester abortion, when uterine involution is complete.¹² However, the Summary of Product Characteristics (SPC) for FemCap states that it should not be used until 10 weeks post partum or six weeks post-abortion.⁹

The risks of using a cervical cap outweigh the benefits (WHO Category 3) for women with a history of toxic shock syndrome (TSS).¹² The SPC for FemCap also states that a history of TSS is a contraindication.⁹

Women who are allergic to N-9, a component of all spermicides currently available in the UK,¹⁰ would be unable to use this method. Due to concerns regarding N-9, WHOMECEC advises that the risks of using a cervical cap with spermicide outweighs the benefits (WHO Category 3) for women who are at high risk of HIV, HIV-positive, or have Acquired Immune Deficiency Syndrome (AIDS).¹²

The SPC states that women with a vaginal or cervical abnormality, gross obesity, current cervical or vaginal infection, cancer of the cervix or for whom pregnancy poses a risk to health should not use FemCap.⁹ Additionally, FemCap is unsuitable for those unable to insert, position and remove the device correctly, or understand the instructions for use.⁹

Published evidence

A phase II/III multicentre, randomised, open-label, parallel group study conducted by CONRAD at ten sites in the United States compared the safety and efficacy of FemCap (without the removal strap) to the Ortho All-Flex diaphragm (both used with spermicide).² A total of 841 sexually active women between the ages of 18 and 40 years, with regular menstrual cycles and in monogamous relationships were enrolled after a negative pregnancy test. A nested study on the colposcopic appearance of the cervix involving 21 FemCap users and 21 diaphragm users was conducted at one site to identify if either device caused cervical changes.

The primary hypothesis was that FemCap was not worse than the diaphragm in contraceptive efficacy. This was defined as the probability of pregnancy during six months of typical use being not more than six percentage points higher among FemCap users compared with diaphragm users. Secondary hypotheses measured safety and acceptability, as well as whether the size of FemCap fitted based on obstetric history was deemed to be the correct size by an investigator.

Neither participants nor investigators could be blinded in this study, although those conducting the analysis were blinded. Each arm of the study required 403 women to have 80% power to reject the primary hypothesis; 419 women were randomised to use FemCap and 422 to use the diaphragm. FemCap users retained the device for at least six hours or for up to 48 hours after intercourse, and could have intercourse as often as desired for the first 42 hours without inserting additional spermicide. Diaphragm users retained the device for at least six hours or for up to 24 hours after intercourse, inserted additional spermicide for each further act of intercourse with the device in place, and removed it six hours after the last act of intercourse. Follow-up visits were conducted at two, six, 12 and 28 weeks post-randomisation with a telephone call at 20 weeks and spontaneous office visits allowed. Participants and their partners completed an acceptability questionnaire at the two-week visit and at discontinuation. Cervical smears were taken at the 12-week visit and at discontinuation.

Completion of the study was defined as use of either device as a primary contraceptive method for 28 weeks after enrolment. All women assigned to FemCap had their device inserted and checked by an investigator, received written instructions, and were shown how to insert and remove the device. Women were required to demonstrate that they could insert and remove the device themselves to remain in the study. Seven percent of the women (53 FemCap users and six diaphragm users) were excluded from the trial at the outset because of fitting problems. One FemCap user in the colposcopy subset also discontinued early. Overall, 37% of FemCap users and 29% of diaphragm users discontinued (the Kaplan-Meier rate ratio for discontinuation of FemCap versus diaphragm was not statistically significant).¹³

Efficacy

Clinical equivalence, as pre-defined by the investigators, between FemCap and the diaphragm was not demonstrated.² The six-month Kaplan-Meier cumulative unadjusted typical-use probability of pregnancy was 13.5% for FemCap users, and 7.9% for diaphragm users. The adjusted risk of pregnancy for FemCap users was

1.96 times that for diaphragm users with an upper 95% confidence limit of 3.01. The six-cycle perfect-use pregnancy estimates were 11.1% (95% CI, 5.0-17.2) and 7.4% (95%CI, 3.1-11.7) for FemCap and the diaphragm respectively. Analysis of the upper limit of the 95% confidence interval for the difference in perfect use probabilities showed that a six percentage-point difference between FemCap and the diaphragm could not be excluded. No statistically significant interaction was found between device and parity, age, or history of previous barrier method use. The use of additional spermicide by diaphragm users for multiple coital acts with the device in place did not appear to affect pregnancy probabilities.

Adverse events

FemCap and diaphragm users showed similar rates of vaginal candidiasis, aetiology-unspecified vaginitis, bacterial vaginosis, leukorrhoea, genital irritation, and dysmenorrhoea.²

Cervical cytology

Cervical smears performed initially, at the 12-week visit, and at discontinuation showed no statistically significant differences in atypical squamous or glandular cells, or in low-grade squamous intraepithelial lesions between the groups.² Analysis of the nested study of colposcopic appearances of the cervix showed that the Kaplan Meier six-month cumulative rate ratio of developing a detectable colposcopy finding was 1.2 for FemCap versus diaphragm.¹³ However, a Cochrane Review concluded that this small subset only had sufficient power to detect a 30% difference in lesion rates between the groups.¹³

Urinary tract infection

Significantly fewer FemCap users developed a UTI (Odds ratio, 0.6; 95% CI, 0.4-1.0).¹³ It is unknown if this is related to less spermicide use or to device design.²

Bleeding after removal of the device

A significantly higher number of FemCap users reported the presence of blood in or on the device when it was removed. (Odds ratio, 2.3; 95%CI, 1.3-4.1).¹³

Coital pain /dyspareunia

Very few women in either arm reported coital pain but FemCap users were less likely than diaphragm users to do so. (OR 0.3; 95%CI 0.1-0.8).¹³

Device problems

Due to inability to fit the device, 1% of women assigned to FemCap were discontinued at baseline with a further 4% being discontinued at follow-up for the same reason.¹³ Significantly more FemCap users (31%) than diaphragm users (6%) reported device dislodgement (OR 5.5; 95%CI, 3.7-8.0).¹³ Significantly more FemCap users (12%) than diaphragm users (4%) had problems with device removal (Odds ratio 3.1; 95% CI, 1.8-5.4).¹³

A small, unpublished study gathered data on the second generation FemCap and compared it to the FemCap arm of the study above.^{1,3} Of 47 women who reported difficulty removing FemCap originally, 21% reported difficulty removing the second generation device.¹ However, a longer safety and acceptability study (also unpublished) indicated that the modifications did not significantly improve ease of device removal.³

Acceptability

Users of both FemCap and diaphragm reported similar rates of bleeding or spotting, vaginal symptoms and discomfort.¹³ Similar proportions of women in both groups liked their device 'somewhat' or 'a lot' (OR 1.1; 95%CI, 0.3-0.7).¹³ Nevertheless, FemCap users were less likely than diaphragm users to report that they would 'probably' or 'definitely' use the device after the study ended (OR 0.5; 95%CI, 0.3-0.7).¹³

What does FemCap offer?

FemCap is a safe, reversible barrier method of contraception for women who cannot, or do not wish to, use another barrier, hormonal or intrauterine method. It is an option for women requiring intermittent contraception and can be purchased over the counter. Nevertheless, as for other cervical caps and diaphragms, FemCap is highly user-dependent and women must be motivated to plan in advance for insertion before intercourse, and to correctly insert and fit the device. Published evidence indicates that the efficacy of FemCap is lower than that of conventional diaphragms, which can be provided through the NHS. All female barrier methods (diaphragms, cervical caps and female condoms) have higher failure rates than male condoms, hormonal methods, or copper intrauterine devices, and may be inappropriate first choices for women who do not desire a pregnancy at this point in their lives.

References

1. Mauck C, Baker JM, Barr SP, Johanson W, Archer DF. A Phase 1 Study of Femcap Used with and without Spermicide. Postcoital Testing. *Contraception* 1997;**56**:111-5.
2. Mauck C, Callahan M, Weiner DH, Dominik R, FemCap Investigators group. A Comparative Study of the Safety and Efficacy of FemCap, a New Vaginal Barrier Contraceptive, and the Ortho All-Flex Diaphragm. *Contraception* 1999;**60**:71-80.
3. Contraceptive Research and Development Program (CONRAD). CONRAD 2000-2001 Biennial Report Making Progress Towards Better Reproductive Health for All. <http://www.conrad.org/assets/conradbien.htm>
4. International Planned Parenthood Federation. IMAP Statement on Barrier Methods of Contraception. IPPF Medical Bulletin 35 Number 4. 2001. London.
5. Bounds W. Contraceptive efficacy of the diaphragm and cervical caps used in conjunction with a spermicide- a fresh look at the evidence. *The British Journal of Family Planning* 1994;**20**:84-7.
6. Hatcher RA, Trussell J, Stewart F, Cates W Jr, Stewart GK, Guest F *et al.* Contraceptive technology. New York: Ardent Media, 1998.
7. Shihata AA. The FemCap: a new contraceptive choice. *The European Journal of Contraception and Reproductive Health Care* 1998;**3**:160-6.
8. Cook L, Nanda K, Grimes D. Diaphragm versus diaphragm with spermicides for contraception (Cochrane Review). *The Cochrane Library* 2003; **1**.
9. About the FemCap 2003 <http://www.sample.femcap.co.uk>
10. *British National Formulary*, No. 48. September 2004. London: British Medical Association and the Royal Pharmaceutical Society of Great Britain, 2004. <http://www.BNF.org>
11. World Health Organisation. WHO/CONRAD Technical Consultation on Nonoxynol-9. Geneva, Switzerland: WHO, 2001.
12. World Health Organisation. Improving Access to Quality Care in Family Planning Medical Eligibility Criteria for Contraceptive Use (Third Edition). 2004.
13. Gallo MF, Grimes DA, Schulz KF. Cervical cap versus diaphragm for contraception. (Cochrane Review) *The Cochrane Library* 2003;**1**.

The FFPRHC Clinical Effectiveness Unit team has prepared the advice given in this New Product Review. It is based on a structured search and review of published evidence available at the date of preparation. This New Product Review has been prepared as a service to FFPRHC members, but is not a formal Faculty guidance product; a different and lengthier process produces Faculty guidance. It is not intended to be construed or to serve as a standard of medical care. Such standards are determined on the basis of all clinical data available and are subject to change as scientific knowledge advances. Members are welcome to reproduce this document by photocopying or other means, in order to share the information with colleagues