Chapter 11

The impact of alternatives for abnormal uterine bleeding on hysterectomy rates in a tertiary referral centre

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Introduction

Hysterectomy remains one of the most common major surgical gynaecological procedures. There are, however, marked differences in the number of hysterectomies between countries, from a high of 5.4 per 1000 women in the USA [Farquhar 2002b], through intermediate levels such as Italy (3.7/1000) [Materia 2002] to a low of 1.2 per 1000 in Norway [McPherson 1982]. The number of hysterectomies in The Netherlands in 1998 was estimated at 2.7 per 1000 women [Bröllmann 2001].

Abnormal uterine bleeding caused by intra-uterine abnormalities such as uterine myomas are the most common indication for hysterectomy, accounting for 40% of all hysterectomies [Gimbel 2001; Merrill 2001; Moller 2002]. In the United Kingdom excessive menstrual bleeding in the absence of structural abnormalities (dysfunctional uterine bleeding) is the second most common indication accounting for at least one third of the cases. With such a high prevalence, it is important that the effects of hysterectomy for benign indications are reviewed periodically, particularly since a number of potentially effective alternatives (e.g. levonorgestrel intrauterine device [IUD] and hysteroscopic surgery), reducing length of hospital stay and morbidity, have been developed. However, the belief that the introduction of alternative therapies would substantially reduce the need for hysterectomy had not be materialised yet. Therefore, we retrospectively assessed the influence of alternatives to hysterectomy for abnormal uterine bleeding on hysterectomy rates in our university hospital over a ten-year-period (1995-2004).

Material and Methods

This study was conducted at the department of Gynaecology of the Leiden University Medical Center (Leiden, The Netherlands). Medical records of all premenopausal patients receiving surgery or levonorgestrel-IUD because of abnormal uterine bleeding between January 1st 1995 and December 31st 2004 were reviewed. Abnormal uterine bleeding was defined as menorrhagia, metrorrhagia or intermenstrual bleeding. Patients were excluded in cases of infertility, post menopausal state or (the suspicion of) malignancy of the genital tract.

Eligible patients were identified based on (specific) diagnostic codes (e.g. for menorrhagia, metrorrhagia, intermenstrual bleeding, uterus myomatosus or polyps) used in the registry system of the university hospital. Therapy codes (e.g. for hysteroscopic polypectomy, hysteroscopic myomectomy, endometrial ablation and hysterectomy) were used as a double check to ascertain all eligible women were included. Information on demographic data, date of first appointment, symptoms, diagnosis, pathology and therapy were retrieved from the medical record by individual chart review. Diagnosis was established by histological analysis if possible and classified as abnormal uterine bleeding based on structural abnormalities (uterus myomatosus, endometrial polyp, adenomyosis / endometriosis) or in absence of intra-uterine abnormalities as dysfunctional uterine bleeding. Histological
specimens were obtained at hysterectomy, myomectomy, polypectomy, or endometrial ablation. Diagnosis of patients receiving only a levonorgestrel-IUD was based on ultrasound and/or diagnostic hysteroscopy results.

The total number of patients receiving each procedure as first treatment was estimated, and presented as a percentage of the total number of patients receiving surgical treatment or a levonorgestrel-IUD for abnormal uterine bleeding in the corresponding year. Further, failure of treatment of each patient receiving a levonorgestrel-IUD or hysteroscopic surgery for abnormal uterine bleeding was determined. Failure was defined as the need for subsequent therapy.

The collected information was analysed in the statistical SPSS program (SPSS, version 14, SPSS Inc., Chicago, IL). Normally distributed continuous variables were presented by means, their standard deviations (SD) and 95% confidence intervals (95%-CI). To test whether multiple means were equal, the one-way-ANOVA (analysis of variance) test was used. Categorical data were presented as frequencies and percentages, and analysed by the Pearson’s Chi-square test. Continuous variables that were not normally distributed were presented as median and range. To test whether medians were equal, the Kruskal-Wallis test was used. The Cochrane-Armitage test for trend [Agresti 2002] was applied to determine differences of therapy rates over time. To calculate the intervention-free time of patients requiring subsequent treatment following minimally invasive surgery or insertion of a levonorgestrel-IUD, Kaplan-Meier curves and the log rank-test were used. Significance was reached at a $p$-value <0.05.

**Results**

During the investigated period, 2157 premenopausal patients with abnormal uterine bleeding attended our clinic. Of this group, 1271 (58.9%) patients received oral medical therapy or no treatment at all; the other 886 (41.1%) patients had either surgical therapy or received a levonorgestrel-IUD. Within this timeframe staffing remained similar (staffing performing hysterectomy (n=6), and endoscopic surgery (n=3)).

Patient characteristics are detailed in table 1. The mean age at which levonorgestrel-IUDs (41.6 years) were placed and hysteroscopic surgery (43.1 years) or hysterectomy (44.9 years) were performed differed significantly (one-way-ANOVA test, $p<0.001$). The mean age at which hysterectomy was performed remained similar over the studied period (one-way-ANOVA test, $p=0.940$).

A total of 640 patients received surgery between 1995 and 2004, whilst 246 levonorgestrel-IUDs were placed. Hysterectomy was performed as the initial treatment in 303 (34.2%) patients. In addition, 96 (10.8%) patients received hysterectomy following another procedure.

Within the ten-year study period the percentage of patients receiving endometrial abla-
Table 1 | Demographic characteristics of patients with abnormal uterine bleeding receiving surgery or levonorgestrel-IUD between January 1st 1995 and December 31st 2004.

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>Levonorgestrel-IUD</th>
<th>Hysteroscopic surgery</th>
<th>Hysterectomy</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of patients</td>
<td>246</td>
<td>337</td>
<td>303</td>
<td></td>
</tr>
</tbody>
</table>
| Mean age in years at therapy (SD; 95%-CI) | 41.6 (6.5; 28.8-54.4) | 43.1 (6.4; 30.6-55.6) | 44.9 (4.9; 35.4-54.4) | <0.001
a
| Median delay between first visit and therapy in months (range) | 4.3 (0-99) | 5.9 (0-119) | 5.6 (0-114) | 0.607b |
| Symptoms of abnormal uterine bleeding | <0.001c |
| Menorrhagia | 181 (73.6%) | 112 (67.3%) | 219 (72.3%) |
| Metrorrhagia | 51 (20.7%) | 98 (28.7%) | 83 (27.4%) |
| Intermenstrual bleeding | 14 (5.7%) | 14 (4.0%) | 1 (0.3%) |
| Diagnosis | <0.001c |
| Dysfunctional uterine bleeding | 177 (71.9%) | 59 (17.5%) | 32 (10.6%) |
| Structural abnormality | 69 (28.1%) | 278 (82.5%) | 271 (89.4%) |

*a*one-way ANOVA test; *b*Kruskal-Wallis test; *c*Pearson’s Chi-square test

Figure 1 | Percentage of surgical procedures and placements of levonorgestrel-IUD’s from 1995 to 2004 for premenopausal patients with abnormal uterine bleeding.
tion decreased significantly ($p<0.001$; figure 1), whereas hysteroscopic polyp or myoma removal ($p=0.030$) and insertion of levonorgestrel-IUD ($p<0.001$) both increased significantly from 1995 to 2004.

The percentage of hysterectomies as initial treatment for abnormal uterine bleeding fell significantly from 40.6% to 31.4% ($p=0.005$). The overall hysterectomy rate remained similar ($p=0.449$; figure 2). Only one patient underwent uterine artery embolisation as initial treatment. Since this was not offered frequently in our clinic, we excluded this patient from our analysis.

The intervention-free survival curves of hysteroscopic polyp or myoma removal, endometrial ablation or the insertion of a levonorgestrel-IUD are shown in figure 3. The five-year intervention-free percentage for levonorgestrel-IUDs was 70.6% (SD 3.3%), for hysteroscopic polyp or myoma removal 75.5% (SD 3.4%), and for endometrial ablation 78.0% (SD 4.3%). The log rank-test revealed no difference of intervention-free rates between these procedures ($p=0.067$).

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**Figure 2** | Percentage of hysterectomies rate stratified by year and initial or subsequent treatment in premenopausal therapy among patients with abnormal uterine bleeding.
Figure 3 | Intervention-free time after placement of a levonorgestrel-IUD or hysteroscopic surgery for premenopausal women treated for abnormal uterine bleeding. Censored data represent observations with incomplete follow-up.

Discussion

Even though several alternative treatments have been developed to date, the overall hysterectomy rate in the management of abnormal uterine bleeding did not decrease in our clinic over the years (1995-2004). The numbers of hysteroscopic surgeries and placements of levonorgestrel-IUDs as alternative treatments for this indication increased. On the other hand, the number of women receiving endometrial ablation declined. A probable explanation for this decline is the replacement by the levonorgestrel-IUD, introduced in The Netherlands in 1995 and recommended for dysfunctional uterine bleeding as an alternative therapy to hysterectomy. In our figures the drop of endometrial ablation was accompanied by an increase of levonorgestrel-IUD placements.

The proportion of hysterectomies performed as initial treatment decreased significantly, although the total proportion of hysterectomies performed from 1995 to 2004 remained similar. This was due to the failure of previous therapies. Nevertheless, about 75% of patients treated with hysteroscopic surgery or a levonorgestrel-IUD did not need subsequent surgery. Therefore, we may conclude that in our clinic despite the introduction of alternatives, the hysterectomy rate has not been reduced; it seems, rather, that the threshold for intervention has been lowered. This conclusion is supported by our finding that patients who receive one of the alternative treatments are significantly younger than patients in whom hysterectomy is performed as the initial therapy. Although this phenomenon has been described before, even in other surgical fields [Banu 2005; Bateson
Influence of alternatives on hysterectomy rate

1994; Bridgman 2000; Farquhar 2002a; Garry 2005], there are studies showing the opposite; Jacobson et al. [Jacobson 2006] described a decline in annual hysterectomy rates over the years 1994-2003 in Northern California. However, they estimated the hysterectomy rate for all benign indications (including prolaps and endometriosis), and could not provide disease specific rates, like we did. This is also true for a study by Brölmann et al. [Brölmann 2001], who reported a decrease in hysterectomy rates in The Netherlands from 1991 to 1998. Nevertheless, the annual hysterectomy rate from 1999 to 2004 in The Netherlands according to the national registry system, increased for all benign indications [www.prismant.nl].

A limitation of our study is that data from only one tertiary referral centre have been used, which cannot be extrapolated to The Netherlands in general. Nationwide numbers would have been preferable; though in most nationwide studies only registration codes were used without checking medical records [Bridgman 2000; Brölmann 2001; Farquhar 2002b; Farquhar 2002a; Jacobson 2006]. In our study registration codes were also used, but both diagnosis and therapy codes were consulted to track down eligible patients, followed by reviewing the medical records of all patients included. This makes our study less prone to contain registration related errors. Moreover, our numbers represent individual cases, which gives us the opportunity to interpret re-intervention numbers. With regard to the tertiary referral status of our hospital, we should mention that the diagnostics and treatment of patients with abnormal uterine bleeding in general do not require the expertise of a tertiary centre. Therefore, we do not expect that our population for this specific problem differs significantly from other hospitals in our region.

The question arises why minimally invasive techniques seem to be more of an additive technology rather than a substitutive one. Moreover, we have to question whether the use of minimally invasive techniques should be encouraged or not. Since hysterectomy and hysteroscopic surgery rates are increasing, costs are likely to increase. Moreover, the increase of minimally invasive treatment is accompanied by re-intervention because of failure, accounting for a significant proportion of the increased surgery rate. By this means and with regard to the shifting threshold for intervention, failure alone may result in re-intervention whilst it is questionable whether the severity of complaints objectively may have called for hysterectomy. On the other hand, a significant improvement in health-related quality of life has highlighted the importance of treating abnormal uterine bleeding [Hurskainen 2001], as well emphasising that medical treatment is inferior to surgical treatment [Learman 2004]. Therefore, a possible explanation for the additive effect of minimally invasive techniques might be that treatment of abnormal uterine bleeding has been unsatisfactory in the past. As a result of a less invasive treatment armamentarium nowadays, the proportion of surgical treatment could be increased in order to supply the mounting demand. Moreover, the majority of patients treated with
hysteroscopic surgery or a levonorgestrel-IUD did not necessitate subsequent surgery, and may be prevented from hysterectomy.

In conclusion, in our clinic the hysterectomy rate in the management of abnormal uterine bleeding did not decrease despite the introduction of alternative therapies. An explanation to this phenomenon remains speculative, though to assure adequate implementation of alternative therapies it is of great importance to determine at least nation-wide and preferably internationally their real impact on costs and satisfaction.