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ORIGINAL ARTICLE

Patient Satisfaction with a Multidisciplinary Team Approach to Uterine Artery Embolisation: Preliminary Results

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ABSTRACT

Objective: *To evaluate patients' experience of uterine artery embolisation (UAE) using a multidisciplinary team approach to treat symptomatic fibroids, as well as clinical outcome and radiological outcome, in our local institution.*

Methods: *This was a single-centre retrospective follow-up study involving the departments of gynaecology, anaesthesiology, and radiology. All women who underwent UAE for symptomatic uterine fibroids from October 2014 to November 2017 were included. Patients received periprocedural monitored anaesthesia care (MAC) and postprocedural anaesthetic care including patient-controlled analgesia. Questionnaires were given to all patients 3 months after UAE to assess their experience in terms of pain control, length of hospital stay, and length of time until return to work. Magnetic resonance imaging was performed before and after UAE to assess radiological outcomes.*

Results: *Periprocedural pain control with MAC and postprocedural pain control with patient-controlled analgesia had mean numeric rating scale pain scores (where 0 represented no pain and 10 represented worst pain imaginable) of 2.0 and 6.4, respectively. Of 26 patients, 14 (53.8%) had length of hospital stay of 2 nights, and 10 (38.5%) took 15 to 20 days to recover after the procedure and return to work. Significant reduction of uterine and fibroid volume was seen on MRIs after UAE ($p < 0.001$).*

Conclusion: *Preliminary results of our multidisciplinary team approach to UAE are promising in terms of patient experience, and radiological outcomes are consistent with the literature. Further studies are required for continuing clinical appraisal and improvement at our institution.*

Key Words: *Leiomyoma; Pain management; Patient satisfaction; Surveys and questionnaires; Uterine artery embolization*

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Data Availability: All data generated or analysed during the present study are available from the corresponding author on reasonable request.

Ethics Approval: This study was approved by the Clinical and Research Ethics Committee of New Territories West Cluster (Ref 18037). All patients provided written informed consent for the procedures and to participate in the survey.

中文摘要

子宮動脈栓塞患者對多學科診療模式的滿意度：初步結果

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目的：評估子宮動脈栓塞（UAE）患者對多學科診療模式治療有症狀肌瘤的滿意度，以及臨床和放射學結果。

方法：這項單中心回顧性隨訪研究涉及婦科、麻醉科和放射科，納入2014年10月至2017年11月期間因徵狀子宮肌瘤接受UAE治療的女性。患者接受圍手術期監測麻醉護理（periprocedural monitored anaesthesia care，MAC）以及包括病人自控鎮痛（patient-controlled analgesia，PCA）的術後麻醉護理。UAE術後 3 個月對所有患者進行問卷調查，評估他們在疼痛控制的體驗、住院時間和康復後重返工作所需時間。於UAE前和UAE後進行磁共振成像以評估放射學結果。

結果：圍手術期MAC和術後PCA疼痛控制的平均疼痛評分分別為2.0和6.4（其中0表示沒有疼痛，10表示可以想像的最嚴重疼痛）。平均住院時間約為2.5晚。在26 名患者中，14名（53.8%）留院2晚，10名（38.5%）在手術後15至20天康復後重返工作。MRI顯示UAE後子宮和肌瘤體積顯著縮小（$p < 0.001$）。

結論：患者對多學科診療模式治療UAE的滿意度初步結果令人鼓舞，放射學結果與文獻一致。需要進一步研究臨床評估和進行持續的相關改進。

INTRODUCTION

Uterine artery embolisation (UAE) is an alternative to surgery for patients with symptomatic fibroids. Compared with surgery, UAE is a less-invasive procedure with reduced complication and anaesthetic risks.[1] Few cases of UAE had been performed in our institution before implementation of our study, largely limited by patient pain intolerance during and after the procedure.

A successful UAE procedure is not determined by radiological outcome only; patients' experience and satisfaction also play a key role. With this in mind, our institution established a multidisciplinary team approach for patients undergoing UAE, with collaboration among the departments of gynaecology, anaesthesiology, and radiology. Since October 2014, UAE in our institution is performed under monitored anaesthesia care (MAC), and the goal of anaesthesia care after UAE is satisfactory patient pain control. Magnetic resonance imaging (MRI) is performed before and after UAE to assess the outcome of embolisation.

The objective of this study was to evaluate patients' experience of a multidisciplinary team approach to UAE in terms of pain control, length of hospital stay, and length of time until return to work. This study may provide useful information on the validity of the anaesthesia methods for UAE and possibly guide future implementation in our practice.

METHODS

Our study was a single-centre retrospective follow-up study involving the departments of gynaecology, anaesthesiology, and radiology for patients with symptomatic fibroids undergoing UAE. Patients experiencing symptoms including menorrhagia, dysmenorrhoea and pressure effects that were diagnosed with fibroids with ultrasound were referred from the gynaecology clinic. The risks and benefits of surgery and UAE were explained to the patients, and patients made the final decision to opt for UAE or surgery. Patients with active pelvic inflammatory disease, renal insufficiency, endometrial carcinoma, undiagnosed pelvic mass, or pregnancy were excluded from this study. Preprocedural MRI was performed to delineate the location of fibroids and the anatomy of uterine arteries.

All patients who underwent UAE for symptomatic uterine fibroids from October 2014 to November 2017 were included in the study. All patients received MAC during UAE, and pain management after UAE was provided by the anaesthetic team, including patient-

controlled analgesia (PCA) and oral medication. All UAE procedures were performed by one of five principal interventional radiologists in our centre with specialist fellowship qualification. Superselective catheterisation of uterine artery branches was performed. Embolic agents used included polyvinyl alcohol particles (Contour; Ivalon, Boston Scientific Inc., Natick [MA], US) and trisacryl gelatin microspheres (Embosphere; Biosphere Medical, Rockland [MA], US). Upon discharge from hospital, patients were scheduled for a gynaecology clinic follow-up examination at 3 months after UAE. Radiological outcome, in terms of uterine fibroid volume reduction, was assessed by MRI at 6 months after UAE.

Uterine Artery Embolisation for Symptomatic Fibroids

All patients in the study were from the gynaecology unit for symptomatic fibroids with the initial diagnosis made by a gynaecologist using ultrasonography. The option of UAE was offered and preferred over conservative treatment or surgery. Informed consent was obtained from patients for UAE with the 3-month follow-up questionnaires. Preprocedural MRI was performed to evaluate the anatomy of the fibroids. Pedunculated subserosal and submucosal fibroids were of concern due to the risk of detachment after UAE and the possible need for subsequent endoscopic intervention for removal.[1] The vascular anatomy depicted on MRI provided a roadmap for planning UAE. Multidisciplinary team meetings were held to discuss each case before UAE for feasibility, mode of anaesthesia and pain control, MRI findings, and anticipation of potential risk factors and complications. All patients were performed as elective cases with antibiotics coverage before UAE. There were five principal interventional radiologists who performed all the UAE procedures, two had more than 15 years, one had more than 10 years and two had more than 5 years of experience as specialist radiologists, respectively. Under fluoroscopic and digital subtraction angiography guidance (AlluraClarity FD20; Philips, Eindhoven, the Netherlands), the internal iliac arteries were catheterised with 4-French (Fr) Cobra-1 or 4-Fr Sim-1 (Cordis Inc., Bridgewater [NJ], US) catheters. Subsequent catheterisation of both uterine arteries using a microcatheter (2.4-Fr Maestro; Merit Medical Systems, South Jordan [UT], US) were performed with guidance into the ascending branches (distal to horizontal). Embolisations were performed until stasis of contrast material was noted in the uterine arteries. Embolic agents included polyvinyl alcohol (Contour) of 355 to 500 μm and trisacryl gelatin microspheres (Embosphere) of 500 to 700 μm in size.

Pain Control

All UAE were performed under MAC in the presence of an anaesthetist. Patients were premedicated with 90 mg etoricoxib (or 1 g paracetamol if etoricoxib was contra-indicated), 300 mg gabapentin, and 8 mg ondansetron. Drugs used for sedation included target-controlled infusion of propofol (0.5-1.5 μg/mL) or dexmedetomidine (0.2-1 μg/kg/h), fentanyl (25-200 μg), and/or morphine boluses (3-9 mg) for opioid loading to achieve an effective concentration prior to the use of PCA. The drugs used for PCA included fentanyl or morphine and were started as soon as the patient returned to the ward and were continued for 1 to 3 days. For fentanyl PCA, the drug concentration was 20 μg/mL, bolus dose 10 to 24 mg, lock out 5 to 6 minutes, 1-hour limit 100 to 220 μg. For morphine PCA, the drug concentration was 1 mg/mL, bolus dose 1 mg, lock out between bolus injections 8 to 10 minutes, 4-hour limit 18 to 30 mg.

Additional oral analgesics including paracetamol 1 g 4 times per day and etoricoxib 90 mg per day (or gabapentin 300 mg nightly if etoricoxib was contra-indicated) were prescribed on a regular basis for 3 days, then as required for an additional 2 to 4 days. Rescue drugs included tramadol 50 mg every 6 hours orally or intramuscularly and metoclopramide 10 mg every 8 hours intravenously. Each patient was reviewed daily by the pain team until cessation of the use of PCA.

Follow-up Questionnaires

Follow-up questionnaires (online supplementary Appendix) were used to assess patients' experience with UAE in terms of periprocedural and postprocedural pain control, length of hospital stay, symptoms during hospital stay, and length of time until return to work (recovery time). The questionnaires were given to and completed by the patients during the gynaecology clinic follow-up examination at 3 months after UAE. Periprocedural and postprocedural pain control was self-rated by patients using a numeric rating scale (NRS), an 11-point (0 to 10) discrete score in determining pain severity, where 0 represented no pain and 10 represented the worst pain imaginable. Scores of 1 to 3, 4 to 6, and 7 to 9 represented mild, moderate, and severe pain, respectively.[2] The questionnaire also included a list of signs and symptoms that may have been experienced during hospital stay, including pain, nausea, vomiting, fever, elevated blood pressure, shortness of breath, aspiration pneumonia, and

pleural effusion. Nursing staff or doctors explained the signs and symptoms to patients, who were then asked in the questionnaire to select those that were experienced. Patients also self-reported length of hospital stay and length of time until return to work in the questionnaire.

Radiological Outcomes

MRIs were performed before and after UAE to assess volume reduction of uterus and fibroids using a 3.0T MR scanner (Achieva; Philips, Eindhoven, the Netherlands). MRI sequences included T2-weighted, T2-weighted fat-suppressed, T1-weighted, T1-weighted fat-suppressed spectral presaturation with inversion recovery and post-contrast, and magnetic resonance angiography scans. Images were reviewed with a picture archiving and communication system (IMPAX; Agfa-Gevaert Group, Mortsel, Belgium). Imaging features, including number of fibroids, location and size of the largest (dominant) fibroid (intramural, subserosal, submucosal), and size of uterus were recorded. Volumes were calculated assuming an oblate ellipsoid shape of both uterus and fibroid with the formula (AP × TD × CC) × 0.5233, with AP denoting anteroposterior, TD denoting transverse, and CC denoting craniocaudal diameters. The change in size of the dominant fibroid was used to determine volume reduction. Volume measurements and calculations were conducted independently by two radiologists with 5 and 7 years of experience, respectively. Using SPSS (Windows version 23.0; IBM Corp, Armonk [NY], US), a paired t test was performed to determine if volume reduction before and after UAE would be statistically significant in terms of overall uterus and dominant fibroid volume reductions. Kappa statistic was used to measure interobserver variability. The degree of necrosis and enhancement on MRIs before and after UAE were also assessed and discussed in the multidisciplinary team meeting in conjunction with uterus and dominant fibroid volume reduction.

RESULTS

No periprocedural complications were encountered. Questionnaires were completed by all 26 patients at the follow-up examination 3 months after UAE.

Patient-reported Pain

During UAE with MAC, the majority of patients experienced no pain (n = 15, 58%). For periprocedural pain, the mean NRS pain score was 2 and the median NRS pain score was 0. After UAE with oral medication and PCA, all patients experienced different degrees of pain (Table 1).

Table 1. Pain scores self-reported by patients 3 months after undergoing uterine artery embolisation with periprocedural monitored anaesthesia care and postprocedural anaesthetic care including patient-controlled analgesia.*

NRS pain score	Periprocedural pain	Postprocedural pain
0 (no pain)	15 (58%)	0
1-3 (mild)	4 (15%)	5 (19%)
4-6 (moderate)	4 (15%)	5 (19%)
7-9 (severe)	2 (8%)	13 (50%)
10 (unbearable)	1 (4%)	3 (12%)
Mean (median)	2 (0)	6.4 (7)

Abbreviation: NRS = numeric rating scale.
* Data are shown as No. (%) of patients, unless otherwise specified.

Table 2. Length of hospital stay and recovery time self-reported by patients 3 months after undergoing uterine artery embolisation.*

	No. of patients
Hospital stay (nights)	
1	3 (11.5%)
2	14 (53.8%)
3	3 (11.5%)
4	5 (19.2%)
5	1 (3.8%)
Mean (median)	2.5 (2)
Recovery time (days)	
<5	1 (3.8%)
5-10	1 (3.8%)
10-15	8 (30.8%)
15-20	10 (38.5%)
>20	6 (23.1%)
Median	15-20

* Data are shown as No. (%) of patients, unless otherwise specified.

Length of Hospital Stay and Recovery Time

The majority of patients (n = 14, 54%) had two nights in hospital after UAE and experienced pain (73%), fever (4%), nausea (23%), vomiting (46%) and high blood pressure (19%). One patient had a 5-night hospital stay due to postprocedural bradycardia and hypertension. 10 patients (38.5%) took 15 to 20 days to recover after the procedure and return to work (Table 2).

Radiological Outcome

Most patients (76.9%) had multiple uterine fibroids (Table 3). The dominant fibroids were mostly intramural in location (92.3%). The mean volume reduction for the dominant fibroid was 43.6%. The mean reduction of uterine volume was 53.1% ($p < 0.001$). The inter-observer variability (kappa score) for uterus and dominant fibroid volume reductions were 0.64 and 0.60, respectively.

Table 3. Magnetic resonance imaging findings at baseline and at 6 months after uterine artery embolisation.*

MRI findings	No. (%) of patients		
No. of fibroid(s)			
1	6 (23.1%)		
2-4	11 (42.3%)		
>4	9 (34.6%)		
Location of dominant fibroid			
Intramural	24 (92.3%)		
Subserosal	0		
Submucosal	2 (7.7%)		
	Mean volume at baseline, cm^3	Mean volume at 6 months after UAE, cm^3	Mean volume reduction after UAE
Dominant fibroid	311	158	43.6%
Uterus	736	413	53.1%

Abbreviations: MRI = magnetic resonance imaging; UAE = uterine artery embolisation.
* Data are shown as No. (%) of patients, unless otherwise specified.

Table 4. Results of the present study compared with those of the Ontario Uterine Fibroid Embolization Trial.[3,6]

	Our study	Ontario UFE trial
Periprocedural pain score, mean (median)	2 (0)	6.3 (6.0)
Postprocedural pain score, mean (median)	6.4 (7)	7.0 (7.5)
Length of hospital stay, nights, mean (median)	2.5 (2)	1.3 (1)
Length of recovery time, days, median (% of patients)	15-20 (38%)	8-14 (38%)
Mean dominant fibroid volume reduction, %	43.6%	33%
Mean uterus volume reduction, %	53.1%	27%

There was one case of fibroid expulsion after UAE, which was known to be a risk because of the fibroid's submucosal location. For that particular patient, the percentage reduction volume of fibroid was considered as 100%.

DISCUSSION

The Ontario Uterine Fibroid Embolization (UFE) Trial[3] used periprocedural conscious sedation given by radiologists and postprocedural PCA for pain control. Compared with our study, the Ontario UFE trial used similar questionnaire parameters and a similar pain scale (NRS) for periprocedural and postprocedural pain assessment. We compared our patient-reported pain results with those of the Ontario UFE trial.

In terms of periprocedural pain control, our MAC approach yielded consistently better pain score than the Ontario UFE trial[3] (mean score of 2 vs. 6.3). The majority of patients in our study experienced no (58%) or mild (15%) pain (Table 1). This may reflect that periprocedural pain control provided by MAC is better than that provided by conscious sedation. However, an on-site anaesthetist also provided expertise in terms of monitoring patients under conscious sedation.

Concerning postprocedural pain control, both our study and the Ontario UFE trial[3] used PCA methods, which yielded mean pain scores of 6.4 (moderate) and 7.0 (severe), respectively (Table 4). These relatively high scores may be due to post-embolisation syndrome, the symptoms of which include pain, nausea, vomiting, fever, fatigue, and malaise.[4] Post-embolisation syndrome is believed to be the primary source of postprocedural pain for UAE. According to the study by Spencer et al,[5] the symptoms are most severe during the first 2 to 3 hours after the procedure, in particular with pelvic pain and cramping. Afterwards the pain will usually subside to significantly lower level. Nevertheless, the high postprocedural pain score from our study shows the need for more multidisciplinary discussions to improve our current MAC/PCA protocol.

The mean length of hospital stay (2.5 vs. 1.3 nights) and median recovery time (15-20 vs. 10 days) for our study were longer than those for the Ontario UFE trial.[3] This may be because UAE with a multidisciplinary team is a relatively new approach in our hospital, resulting in a conservative approach to ensure patient stability and fitness (hemodynamically stable, symptom-free or stable) for discharge.

Although shorter hospital stay is considered favourable, in the Ontario UFE trial,[3] almost 12% of patients indicated that they felt the length of hospital stay was inadequate. This raised concern with regard to patient safety and satisfaction, as well as clinician confidence for patient discharge. We hope and expect the length of hospital stay to improve and approach international standards compared to the Ontario UFE trial in subsequent UAE as our experience increases.

Our results show that UAE for symptomatic fibroids results in significant uterus and fibroid volume reduction, with mean reductions of 53.1% and 43.6%, respectively. Our results are not inferior to those of the Ontario

UFE trial,[3] which showed reductions of 27% and 33% in uterus and dominant fibroid volume, respectively (Table 4). Our results were consistent with previous systematic reviews from international studies which have shown reductions in mean uterine volume of 26% to 59% and in dominant fibroid volume of 40% to 75% in the first 6 months after UAE.[6,7]

Limitations

Questionnaires were conducted after 3 months from hospital discharge at outpatient clinic, which may have resulted in recall bias. For surveys carried out during hospital stay, patients may decline to give an honest assessment if they feel that it might affect their ongoing inpatient treatment or management. The 3-month delays eliminate these possibilities, and allow adequate time for assessment of length of hospital stay and return to work after UAE.

CONCLUSION

Preliminary results of UAE with a multidisciplinary team approach are promising in terms of patient experience.

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