Thermal Ablation Therapy for Uterine Fibroid &Adenomyosis

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高醫海扶刀治療中心

- 高醫於2015年4月開始引進海扶刀設備，由鄭丞傑教授及龍震宇教授開創及設立了南台灣第一個海扶治療中心
- 目前高醫海扶治療中心治療經驗豐富，服務量的個案累計人數已經高達1000列，達成全國最大規模量的海扶治療中心，在國際間享有聲譽。

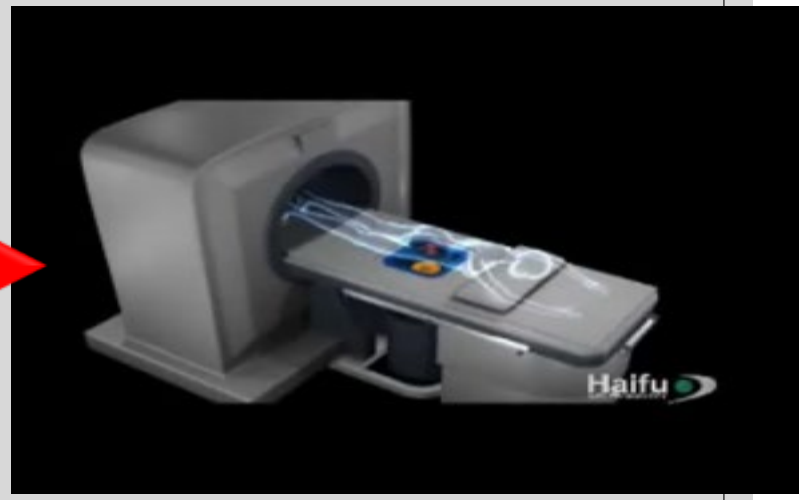
Evolution of Surgery

Traditional Surgery

巨创

Laparoscopic Surgey
（1987,Mouret,Francia）

微创

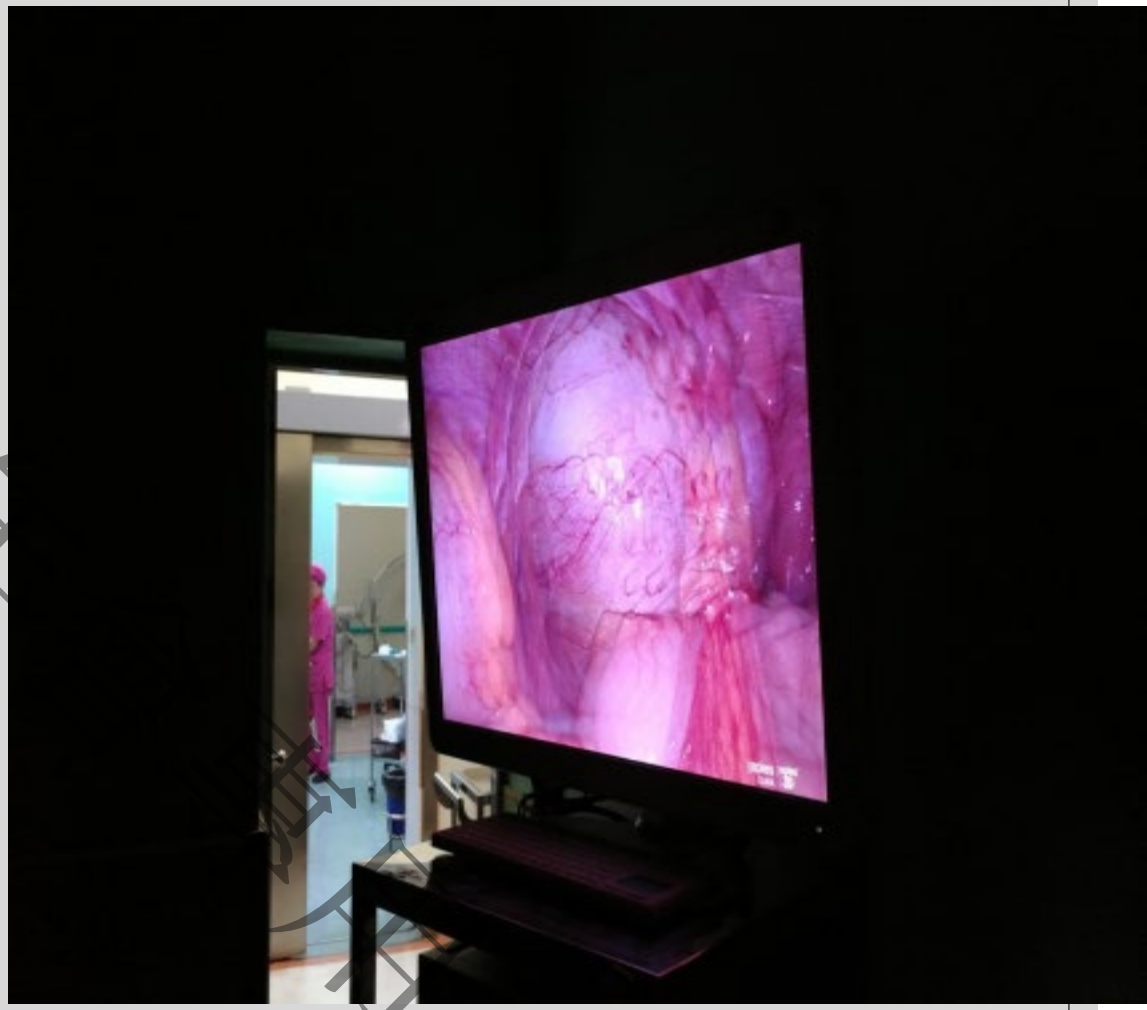


Extracorporeal noninvasive surgery
(Ultrasound Ablation, HIFU)

无创

Treatments—Minimize harm to patients.

3-D Laparoscopy



LESS (Laparo-Endoscopic Single-Site)

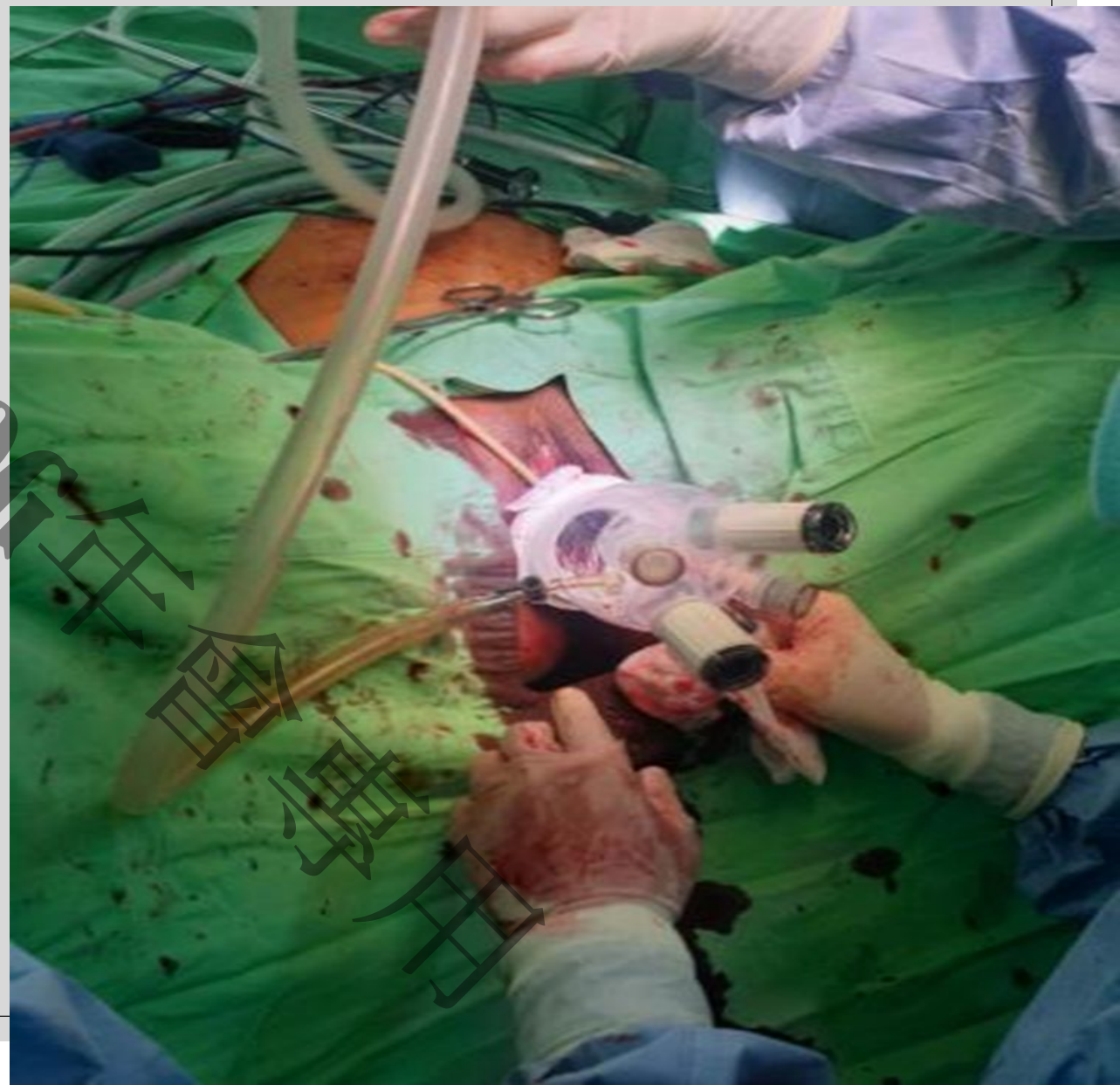
聽說要訓練到整條子宮香腸不能斷

何美靜和其他7人

讚 留言 分享

NOTES

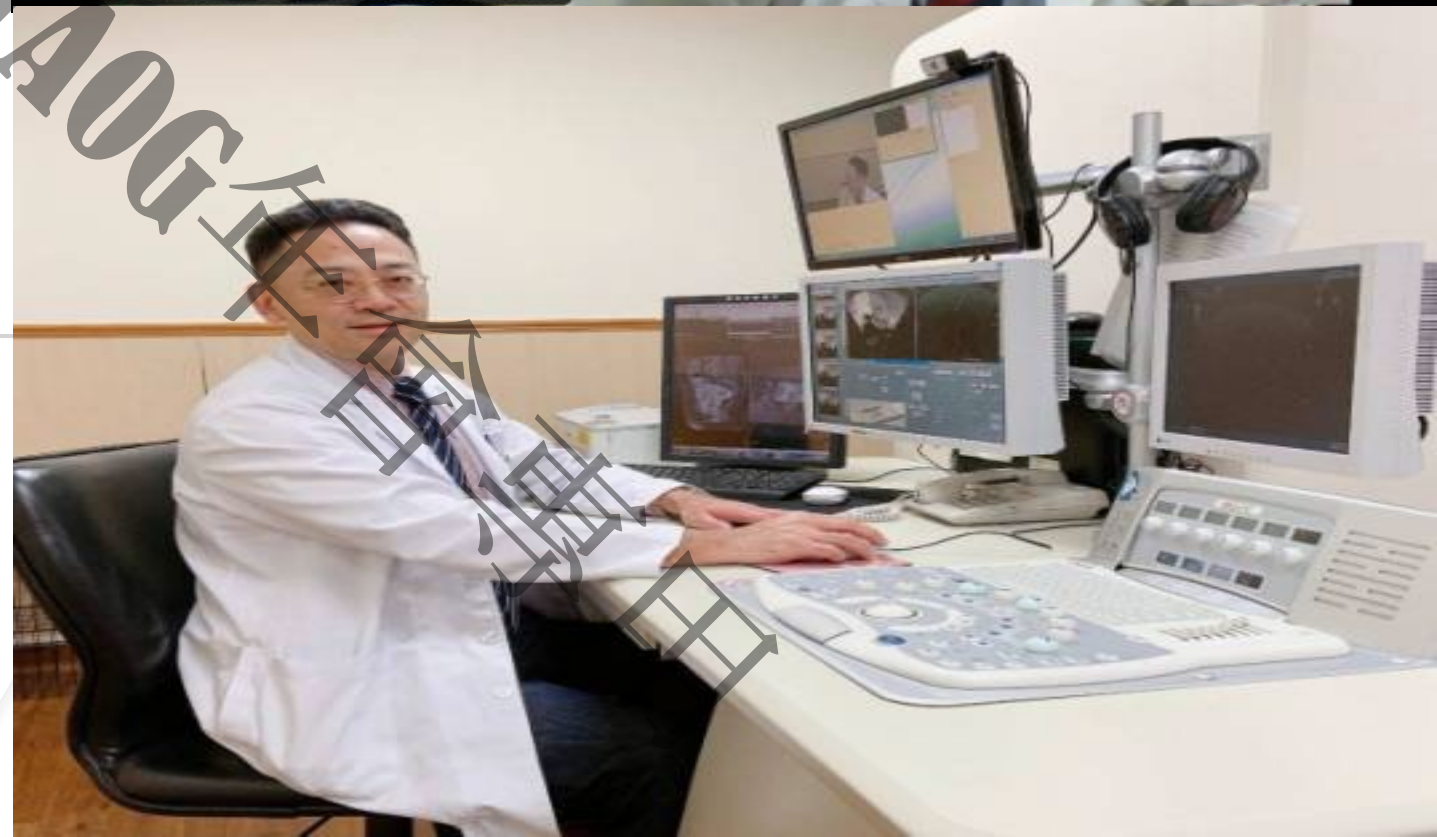
(natural orifice transluminal endoscopic surgery)



Da Vinci Sx

Now We Do Treatment With Mouse

Click !!



全台HIFU治療量統計

Hospital	launch	廠牌	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CSMUH 中山醫附醫	2014/08	重慶海扶	7	97	113	115	115	129	131	101	127	110	1045
Taoyuan CGMH桃園長庚	2014/12	重慶海扶	-	99	82	84	89	96	132	82	129	166	959
KMUH高醫附醫	2015/04	重慶海扶	-	76	159	206	121	141	94	84	94	66	1041
SAH高雄生安	2018/02	重慶海扶	-	-	-	-	10	54	59	92	88	84	387
PGH台北博仁	2019/01	重慶海扶	-	-	-	-	-	171	176	101	63	21	532
Kaohsiung CGMH 高雄長庚	2019/01	重慶海扶	-	-	-	-	-	43	23	41	69	64	240
KGH郭綜合	2019/04	普羅海芙	-	-	-	-	-	55	48	24	-	-	127
KMSH高雄小港	2016/07	重慶海扶	-	-	-	-	-	32	35	36	25	37	165
CMUH中國醫附醫	2020/08	普羅海芙	-	-	-	-	-	-	11	38	28	51	128
TSCH臺北秀傳	2020/10	普羅海芙	-	-	-	-	-	-	25	170	146	178	519
EDH義大大昌	2021/04	普羅海芙	-	-	-	-	-	-	-	86	81	79	246
CSH台北中山	2021/04	重慶海扶	-	-	-	-	-	-	-	32	62	70	164
KVGH高雄榮總	2021/07	普羅海芙	-	-	-	-	-	-	-	3	11	26	40
TGH童綜合	2021/10	普羅海芙	-	-	-	-	-	-	-	2	27	22	51
TAH台北台安	2022/02	普羅海芙	-	-	-	-	-	-	-	-	99	151	250
Dalin TCH大林慈濟	2022/06	振磐Episonica	-	-	-	-	-	-	-	-	10	17	27
KNH台北康寧	2022/07	普羅海芙	-	-	-	-	-	-	-	-	8	13	21
KTGH光田	2022/10	重慶海扶	-	-	-	-	-	-	-	-	5	55	60
Hualien TCH花蓮慈濟	2023/05	振磐Episonica	-	-	-	-	-	-	-	-	-	10	10
TMANH台南安南醫院	2023/08	普羅海芙	-	-	-	-	-	-	-	-	-	19	19
CSMUH 中山醫附醫	2023/09	普羅海芙	-	-	-	-	-	-	-	-	-	24	24
總計			7	272	354	405	335	721	734	892	1072	1263	6055

台灣婦科腫瘤消融醫學會（2024.01統計）

** 海扶刀 9　海芙刀 10　Mg

超音波導引HIFU設備類型

俯臥式海扶刀

2014年引進

仰臥式海芙刀

2019年引進

海芙與海扶比較

	海芙刀	海扶刀
身體姿勢	仰臥式	俯臥式（腹部泡在10度C冰水中）
麻醉	輕度鎮靜鎮痛或舒眠麻醉	深度鎮靜鎮痛或舒眠麻醉
術前清腸	一般空腹8小時不需要灌腸	需徹底清腸，術前清流質飲食2天
舒適度	極佳	佳
病灶大小	15公分以上通常需要2次治療	

研究成果及應用

BJOG An International Journal of Obstetrics and Gynaecology
Royal College of Obstetricians & Gynaecologists

BJOG Exchange

Re: Pregnancy outcomes in patients with uterine fibroids treated with ultrasound-guided high-intensity focused ultrasound: Is the noninvasive nature of HIFU ablation for uterine fibroids and adenomyosis setting patients up for future operative delivery?

Kae-Yng Ou, Cherng-Jye Jeng, Cheng-Yu Long, Linus Chuang

First published: 06 February 2018 | https://doi.org/10.1111/1471-0528.15114

IF 5.8

BJOG An International Journal of Obstetrics and Gynaecology
Royal College of Obstetricians & Gynaecologists

BJOG Exchange

Re: A comparison of the cost–utility of ultrasound-guided high-intensity focused ultrasound and hysterectomy for adenomyosis: a retrospective study: Is the cost-effectiveness of HIFU for adenomyosis and fibroids feasible?

Kae-Yng Ou, Cherng-Jye Jeng, Cheng-Yu Long, Linus Chuang

First published: 06 February 2018 | https://doi.org/10.1111/1471-0528.15115 | Citations: 1

IF 5.8

Contents lists available at ScienceDirect
Taiwanese Journal of Obstetrics & Gynecology
journal homepage: www.tjog-online.com

IF 2.1

Original Article

Comparison of magnetic resonance-guided high-intensity focused ultrasound with uterine artery embolization for the treatment of uterine myoma: A systematic literature review and meta-analysis

Cherng-Jye Jeng [a, b], Cheng-Yu Long [a, b], Linus T. Chuang [b, c, *]

Contents lists available at ScienceDirect
Taiwanese Journal of Obstetrics & Gynecology
journal homepage: www.tjog-online.com

IF 2.1

Case Report

Acute renal insufficiency and thrombocytopenia after high-intensity focused ultrasound (HIFU) ablation for uterine myomas

Chin-Ru Ker [a, b], Kae-Ying Ou [a], Cheng-Yu Long [a, b, c], Linus Chuang [d], Cherng-Jye Jeng [a, b, *]

Contents lists available at ScienceDirect
Taiwanese Journal of Obstetrics & Gynecology
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IF 2.1

Original Article

500 Cases of High-intensity Focused Ultrasound (HIFU) Ablated Uterine Fibroids and Adenomyosis

Cherng-Jye Jeng [a, b], Kae-Ying Ou [a], Cheng-Yu Long [a, b, c], Linus Chuang [d], Chin-Ru Ker [a, b, *]

Clinical and Experimental Obstetrics & Gynecology

Clin. Exp. Obstet. Gynecol. **2022**; 49(11): 248
https://doi.org/10.31083/j.ceog4911248

Systematic Review

Comparison of the Clinical Outcomes and Efficiencies of HIFU (High-Intensity Focused Ultrasound), Da Vinci Robotic Surgery and Laparoscopic Surgery for Uterine Fibroids: A Systematic Review and Meta-Analysis

Altangerel Otgontuya[1], Cherng-Jye Jeng[2,3,4]*, Trong-Neng Wu[1], Linus T. Chuang[5], Jenta Shen[6]

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2022, VOL. 39, NO. 1, 485–489
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IJH INTERNATIONAL JOURNAL OF HYPERTHERMIA and thermal therapies

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High-intensity focused ultrasound treatment for large and small solitary uterine fibroids

Chih-Ting Chang[a], Cherng-Jye Jeng[b,c], Cheng-Yu Long[a], Linus T. Chuang[d] and Jenta Shen[e]

Taiwanese Journal of Obstetrics & Gynecology 59 (2020) 865–871

Contents lists available at ScienceDirect

Taiwanese Journal of Obstetrics & Gynecology

journal homepage: www.tjog-online.com

Original Article

500 Cases of High-intensity Focused Ultrasound (HIFU) Ablated Uterine Fibroids and Adenomyosis

Cherng-Jye Jeng [a, b], Kae-Ying Ou [a], Cheng-Yu Long [a, b, c], Linus Chuang [d], Chin-Ru Ker [a, b, *]

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High-intensity focused ultrasound ablation (HIFU)
Non-invasiveness

ABSTRACT

Objective: Clinical outcomes of 500 high-intensity focused ultrasound (HIFU)-treated uterine fibroids and adenomyosis are analyzed and presented.
Materials and methods: This is a retrospective cross-sectional analysis from a single tertiary medical center. From April 2015 to October 2018, 546 cases were enrolled for the study. After excluding 46 patients with less than 3 months of follow-up period, there were 404 fibroids, 149 adenomyosis and 53 mixed conditions entered for analysis. The patients' uterine fibroids and adenomyosis were treated by HIFU according to Chongqing Haifu protocol, with 12 cm diameter transducer of focal length 10—16 cm at 0.8 or 1.6 MHz T2-weight MRI imaging was rendered prior to and 3 month post treatment to assess lesion volume change using non-perfusion volume, which was the primary outcome. Secondary outcomes including quality of life, subjective satisfaction, adverse events and pregnancy rate were determined using self-reported questionnaires. The mean follow up period ranged from 3 to 38 months with an average of 21 months.
Results: Three months after HIFU-treated uterine fibroids and adenomyosis, the lesion size reduced 40.2% and 46.3%, respectively. Symptoms all improved with better quality of life for the fibroid group, while those with adenomyosis or combined diseases benefit the most from pain control. Serum CA125 decreased significantly for all studied groups, and LDH only showed improvement for fibroids group. Number of adverse events is comparable to Chongqing data (approximately 10.2%), with mostly mild and self-resolving conditions. No permanent sequelae or death was documented. Twelve pregnancies are reported in this cohort.
Conclusion: HIFU is safe and effective in treating uterine fibroids and adenomyosis. The results are reproducible if standardized treatment schedules are followed. It is a promising treatment alternative with the advantages of precision, non-invasiveness, rapid recovery and readiness for pregnancy.

Introduction

Uterine fibroids and adenomyosis are common benign pathology condition of the female, especially in childbearing age. The incidence ranges from 20 to 40% in reproductive aged women [1]. For this reason, they may gravely affect the fertility of women and cause cyclic menstruation symptoms such as dysmenorrhea and hypermenorrhea. Although there are various medications available for fibroid treatment including hormonal GnRH treatment and Ulipristal acetate, these methods of control are temporary and sometimes futile in resistant cases. The counselling of High-intensity Focused Ultrasound (HIFU) ablation for uterine fibroids involve discussions on surgical options, such as open laparotomy or laparoscopic myomectomy. The patient is advised also on the risk of recurrent growth and re-intervention and medications with adverse or undesirable side-effects.

HIFU ablation presents an attractive option to conventional and surgical medicine, as it is non-invasive, requires minimal hospitalization, has no surgical wound, and has good relief and outcome in many patients. Social and economic cost in days lost of work and production are minimized compared to open surgery. Other growing applications of HIFU ablation include liver cancer, osteosarcoma and solid tumors such as the kidney, breast, thyroid and prostate [2,3].

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E-mail address: ruruk19@hotmail.com (C.-R. Ker).

https://doi.org/10.1016/j.tjog.2020.09.013

	KMUH (700 cases)	Chongqing(9988 cases)
Description	Number (% of patients experiencing adverse effects)	
Vaginal secretion	60(8.58)	874 (8.75)
Lower abdominal pain	15(2.15)	225 (2.25)
Leg pain	2 (0.29)	76(0.76)
Hematuria	4 (0.58)	52(0.52)
Blurred vision	0(0)	2 (0.02)
Skin burns	2 (0.29)	26 (0.26)
Urinary retention	1(0.15)	16 (0.16)
Fever	0(0)	4 (0.04)
Acute renal failure	1(0.15)	3 (0.03)
Intestinal perforation	0(0)	2 (0. 02)
Hernia in abdominal wall	0(0)	1 (0.01)
Thrombocytopenia	1 (0.15)	0(0)
Major complications	5(0.72)	108(1.08)

併發症比重慶海扶原廠還低！

Baseline Characteristics of Patients with surgical re-intervention of HIFU-treated leiomyoma

- April 2015 - June 2020
- A total of 557 were included for treatment using Haifu JC Focused Ultrasound Tumor Therapeutic System
- Follow-up time : 6-60 months
- Operative procedure: hysterectomy or myomectomy, hysteroscopy

Surgical re-intervention rate : 5.0%

No. of patients	28
Age range (y)	40.3± 6.9
Body mass index (kg/m^2)	22.9±4.5
Size of uterus (cm^3)	377.8 ± 369.3
Mean size of fibroids(cm^3)	184.0 ± 251.6
Maximal diameter for fibroid (cm)	

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High-intensity focused ultrasound treatment for large and small solitary uterine fibroids

Chih-Ting Chang, Cherng-Jye Jeng, Cheng-Yu Long, Linus T. Chuang & Jenta Shen

Table 2. Changes in the size of uterus and solitary fibroid lesion.

Value	≥10 cm ($n = 31$)	<10 cm ($n = 76$)	p Value
Size of uterus			
Before treatment (cm^3)	1003.8 ± 417.6	324.0±162.6	<0.0001
After treatment (3 months) (cm^3)	806.2 ± 351.9	243.1 ± 124.4	<0.0001
Uterine reduction rate (%)	19.1 ± 15.2	24.1 ± 17.4	0.093
Size of fibroid lesion			
Before treatment (cm^3)	728.4 ± 342.5	139.6 ± 96.7	<0.0001
After treatment (3 months) (cm^3)	487.7 ± 263.3	78.8 ± 69.0	<0.0001
Fibroid reduction rate (%)	32.8 ± 19.8	44.1 ± 27.5	0.0021
NPVR (3 months after treatment)	53.46 ± 33.18	51.32 ± 33.69	0.757

NPVR: nonperfusion volume rate.

Symptomatic Improvement: Mean Scores at Baseline and 6 Months After Treatment

HIFU (n=75)

Variable scores	Pre- treatment	Post-treatment	P values*
OABSS	3.5 ± 3.1	2.6 ± 2.3	0.005**
UDI-6	16.1 ± 14.9	9.8 ±5.8	0.000**
IIQ-7	11.2 ± 10.5	5.0 ± 2.6	0.000**
ICIQ-SF	3.0 ± 4.6	1.9 ± 3.2	0.009**

* Paired t-test. ** Statistical significance

OABSS , Overactive Bladder Symptom Score ;UDI-6,Urinary Distress Index;IIQ-7, Incontinence Impact Questionnaire; ICIQ-SF; International Consultation on Incontinence Questionnaire - Short Form" (ICIQ-SF)

Table2. Changes in scores of Female Sexual Function Index (FSFI) before and after treatment of HIFU (n= 63)

	Pre-treatment	Post-treatment	P
FSFI	28.83± 30.82	37.25±35.26	0. 022**
Desire(1,2)	3.17± 1.42	3.67± 1.66	0. 003**
Arousal (3-6)	4.65± 5.59	6.30± 6.31	0. 012**
Lubrication(7-10)	6.06± 7.43	7.86± 7.98	0. 049**
Orgasm(11-13)	4.60± 5.62	5.79± 5.82	0. 039**
Satisfaction(14-16)	5.51± 5.98	6.22±6.22	0. 223
Pain(17-19)	4.92± 6.01	6.24± 6.31	0. 076

＊significant difference;
Data are given as median (range) or mean± standard deviation.
Paired Sample t test

NICE National Institute for Health and Care Excellence

NICE guidance

Ultrasound-guided high-intensity transcutaneous focused ultrasound for symptomatic uterine fibroids

Interventional procedures guidance
Published: 24 July 2019
www.nice.org.uk/guidance/ipg657

2019 UK NICE guidance


113年度TAOG年會事由


SAG T2
dSAG
sSAG(A
COR T2
TRA T2
dADC b
sTRA D
Tra T1_
DYN P
DYN 1
#501 36
#602 36
#603 36
#701 32
#901 56
#1002 56
#1003 56
#1101 12
#1201 47
#1301 47
H
Uterus
1.5
SE
SE 501
IM 18
P
60
90
4

Conclusions

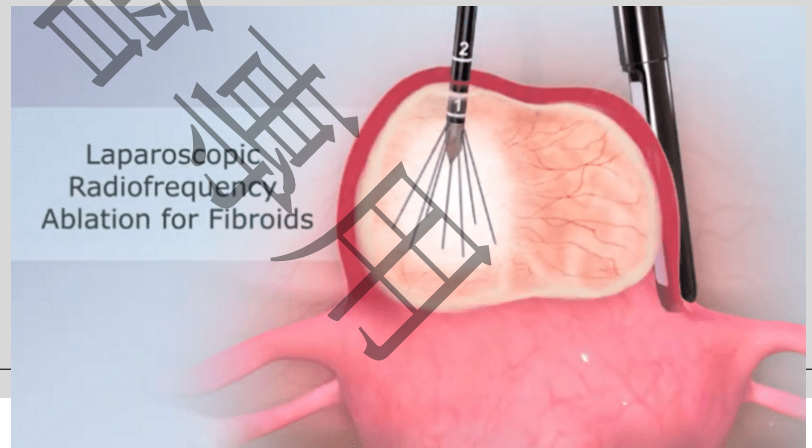
- HIFU treatment showed significant improvement in **uterine reduction** rate, **fibroid reduction** rate and **genitourinary symptoms** after Sx.

- Apart from compression effect, adenomyotic tissues highly express **inflammatory and neurogenic factors** such as **IL-1β, CRH** (corticotropin-releasing hormone), and **NGF**, which may affect neurons of lower urinary tract.

- LUTS symptoms : **OABSS , IIQ-7, UDI-6 , ICIQ-SF**

- Sexual Function - subjective improvement in certain domains of **FSFI.**

Recently, some less invasive treatments have emerged, such as image-guided ablation techniques, including high-intensity focused ultrasound ablation (HIFU), radiofrequency ablation (RFA) and microwave ablation (MWA)



Comparison of HIFU vs. Microwave Ablation

	HIFU	Microwave
1. Adenomyosis with subserosal myoma		V
2. Concomitant Ovarian Tumor		V
3. Unexplained Dysmenorrhea		V
4. EM Ablation demand		V
5. Huge Vertical Scar		V
6. Price		V
7. No Wound, no Adhesion & Bleeding (Non-invasive)	V	

2021.9.22.高醫團隊臨床實證全國第一例子宮肌瘤微波消融手術

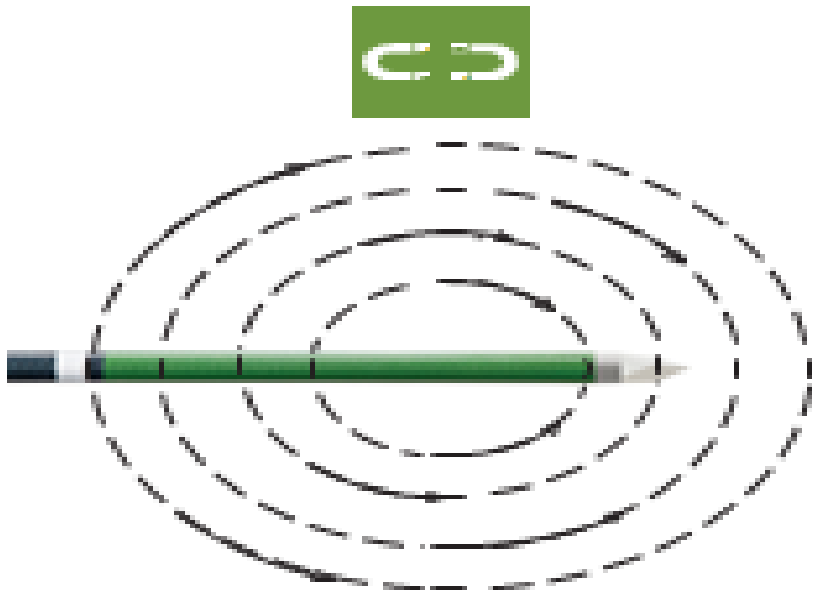
儀器設備

- **微波消融**

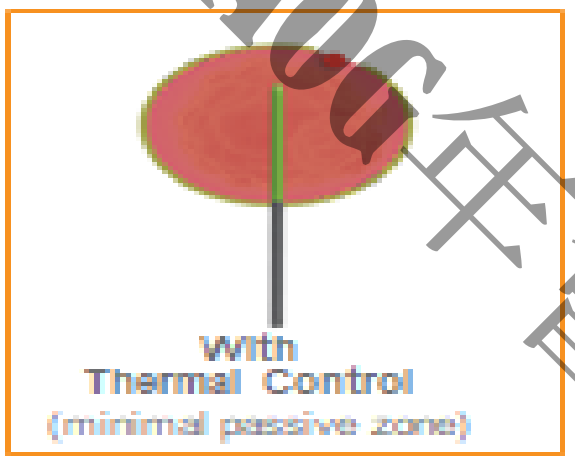
透過微波傳導針直接進入子宮肌（腺）瘤的內，透過電磁場使水分子快速轉動而快速形成大量熱能，將腫瘤高溫消融掉。微波傳導針可透過經皮的方式進入腫瘤也可透過經陰道穿刺的方式，為了安全起見，可以透過搭配腹腔鏡及即時超音波來確定進真的位子與深度，一樣無輻射危險且術後可以快速恢復。

儀器設備

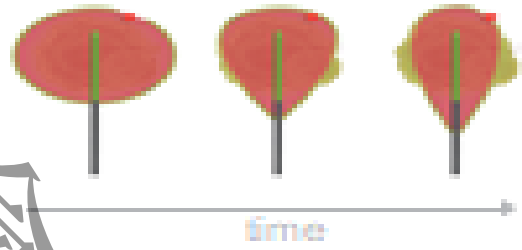
Thermosphere Technology

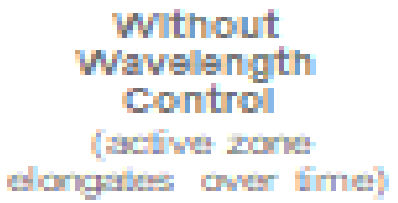


FIELD CONTROL

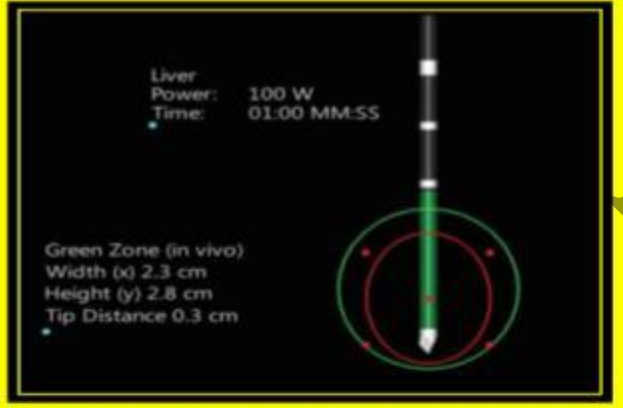


THERMAL CONTROL

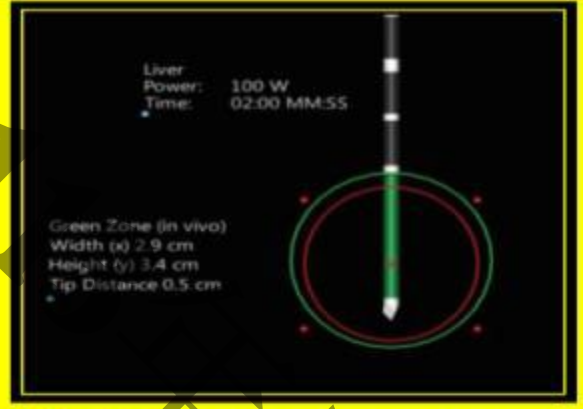




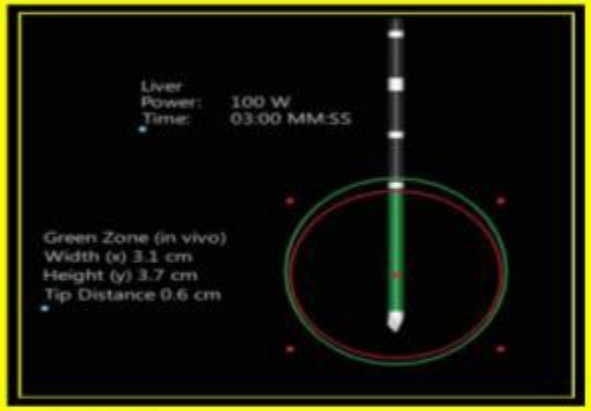
WAVELENGTH CONTROL



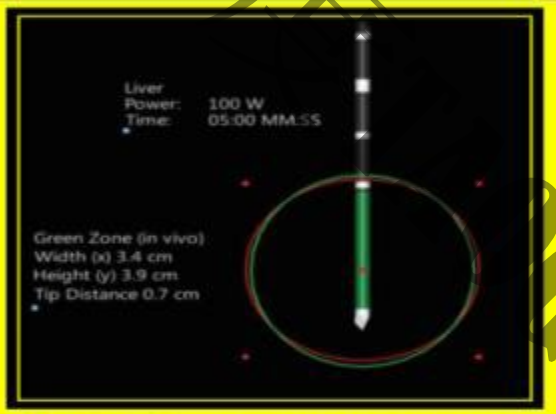
100W 01:00 W(2.3)XH(2.8) TIP(0.3)



100W 02:00 W(2.9)XH(3.4) TIP(0.5)



100W 03:00 W(3.1)XH(3.7) TIP(0.6)



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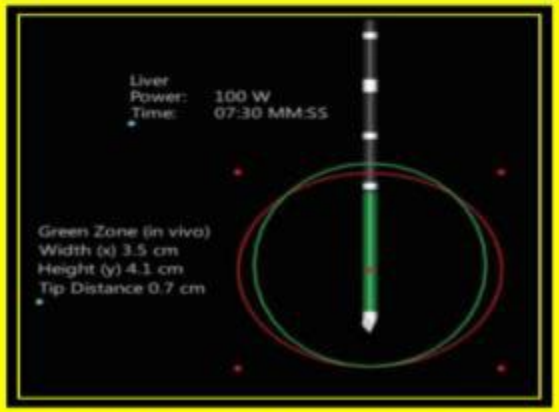
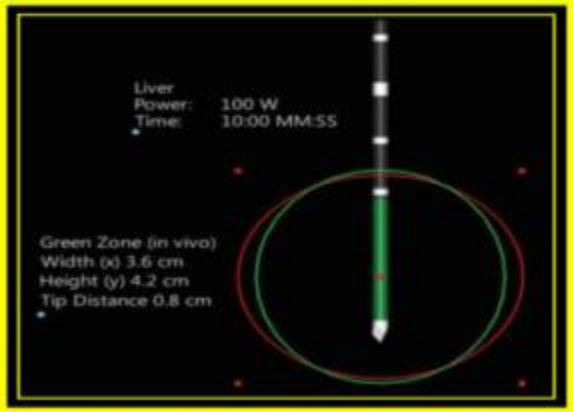


100W 07:30 W(3.5)XH(4.1) TIP(0.7)



100W 10:00 W(3.6)XH(4.2) TIP(0.8)

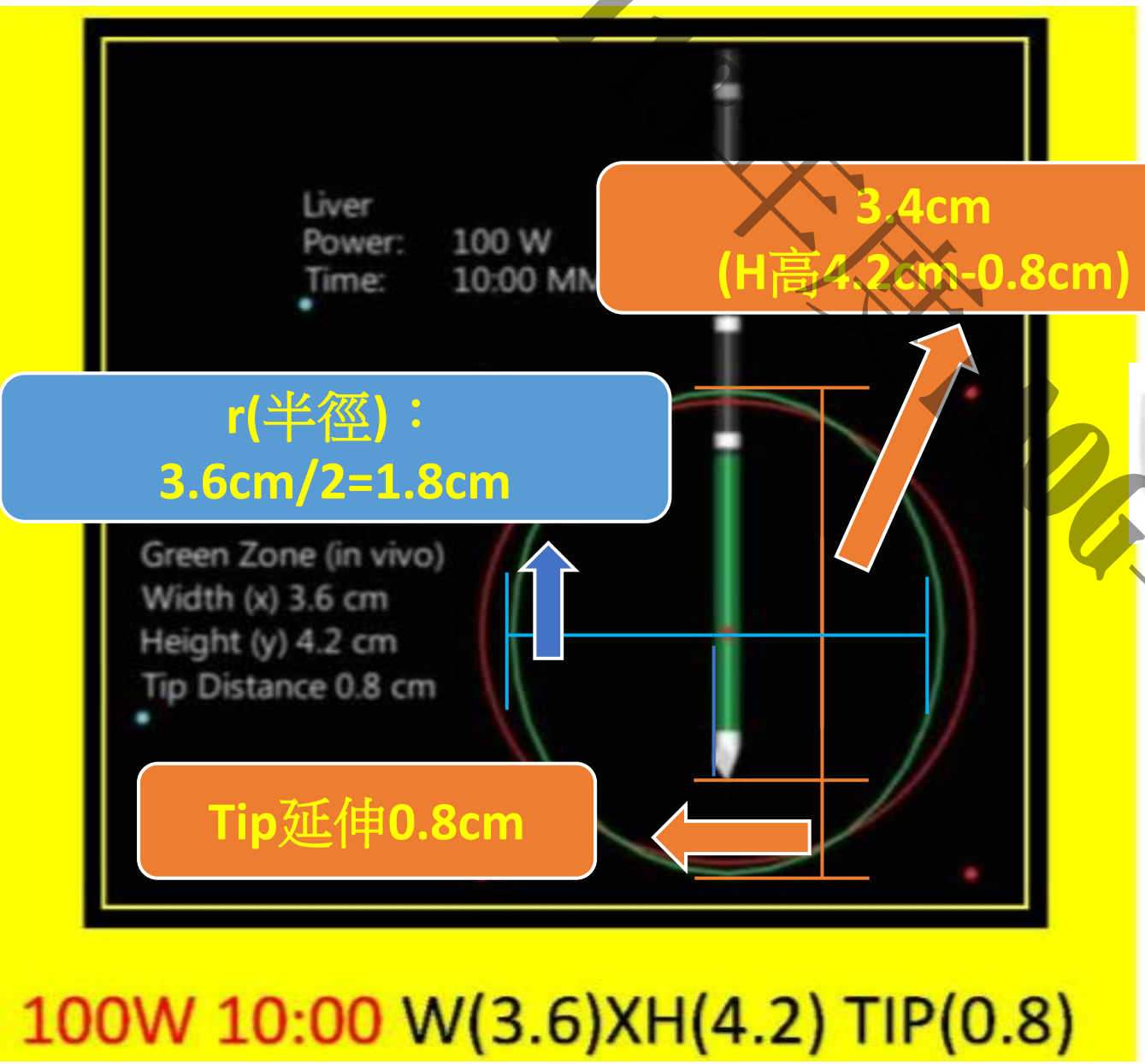
ECO

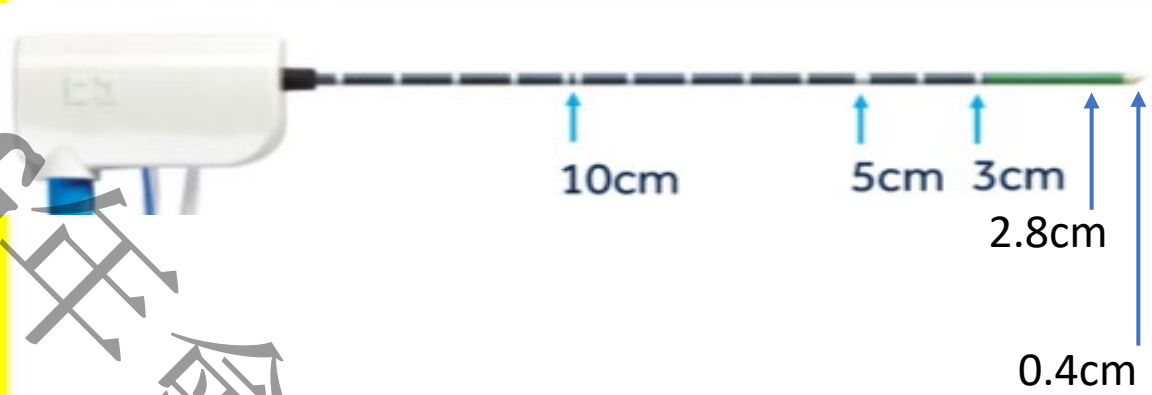
Ablation Zone -Ceramic Antenna on Continuou Mode

14G, Ceramic Antenna, 12mm Exposed Tip, 15cm Shaft, Continuous Mode

	20W(mm)	40W(mm)	60W(mm)	80W(mm)
30s	H 8mm, L 18mm	H 10mm, L 23mm	H 10mm, L 27mm	H 12mm, L 32mm
1min	H 10mm, L 20mm	H 14mm, L 24mm	H 15mm, L 32mm	H 18mm, L 38mm
3min	3mm, H 17mm, L 25mm	3mm, H 22mm, L 32mm	3mm, H 25mm, L 41mm	3mm, H 25mm, L 44mm
5min	3mm, H 20mm, L 26mm	3mm, H 25mm, L 35mm	3mm, H 31mm, L 51mm	3mm, H 36mm, L 57mm
8min	3mm, H 25mm, L 31mm	3mm, H 31mm, L 40mm	3mm, H 36mm, L 52mm	3mm, H 40mm, L 65mm
10min	3mm, H 27mm, L 32mm	3mm, H 35mm, L 45mm	3mm, H 37mm, L 53mm	3mm, H 43mm, L 65mm
12min	3mm, H 30mm, L 33mm	3mm, H 35mm, L 48mm	3mm, H 38mm, L 65mm	3mm, H 55mm, L 70mm

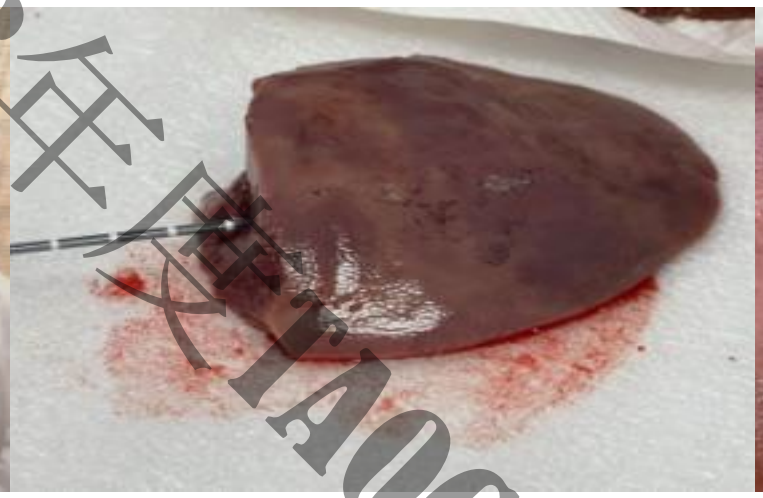
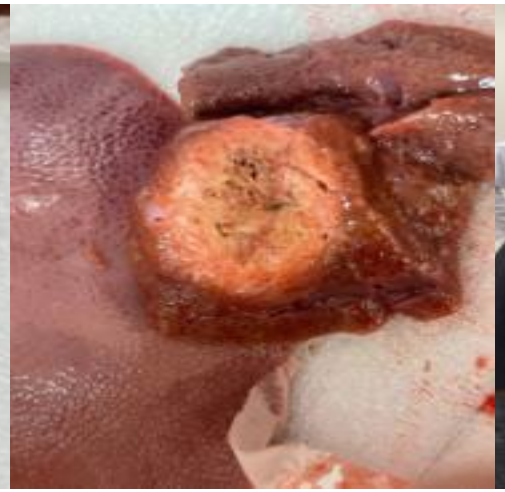
ABLATION ZONE

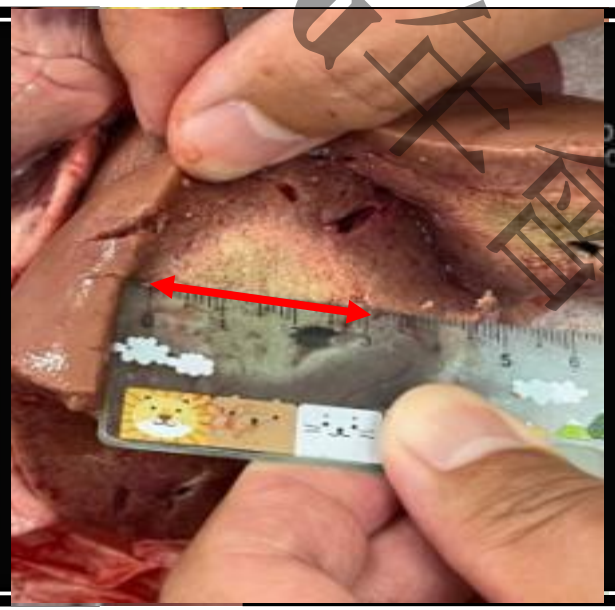


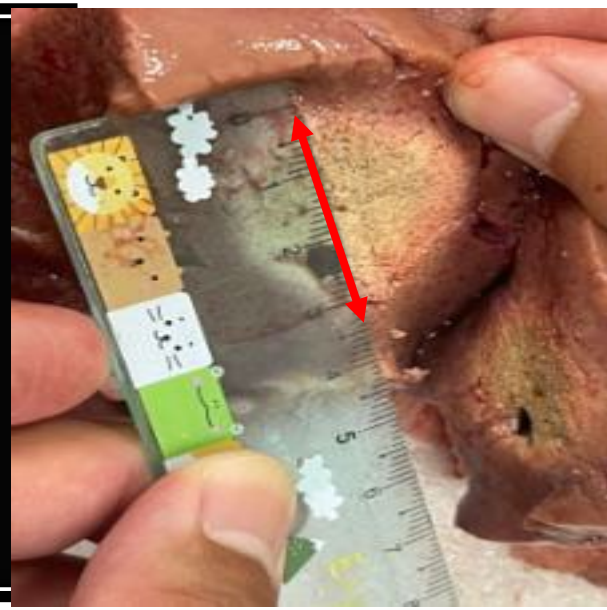


100W 10:00 W(3.6)XH(4.2) TIP(0.8)

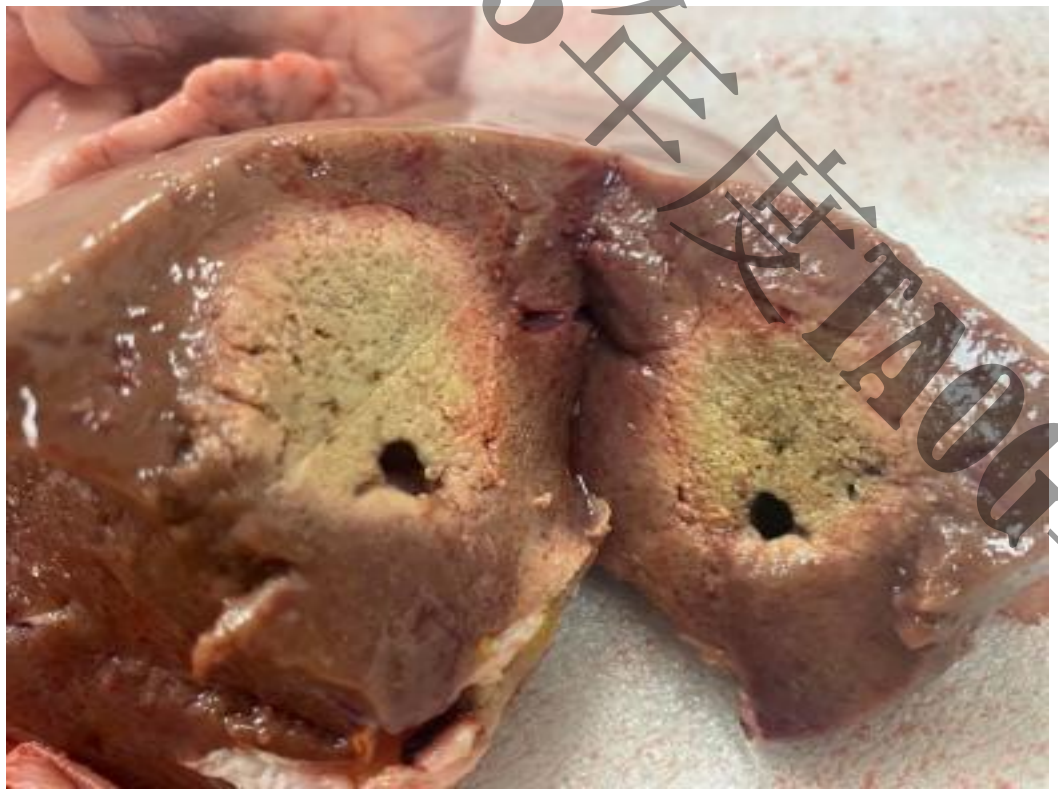
Wet Lab

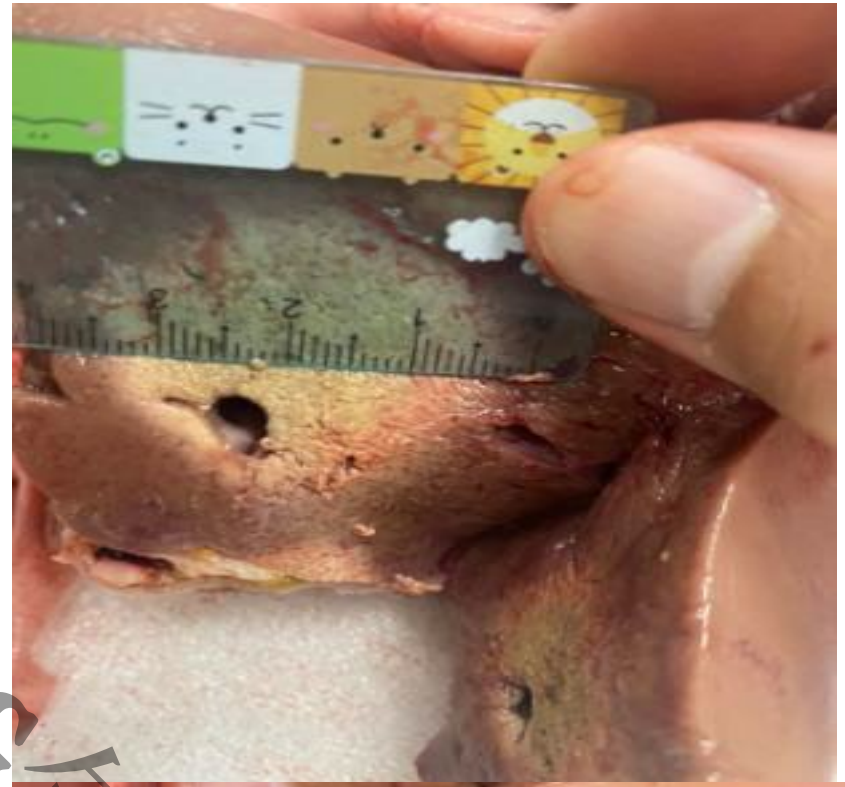




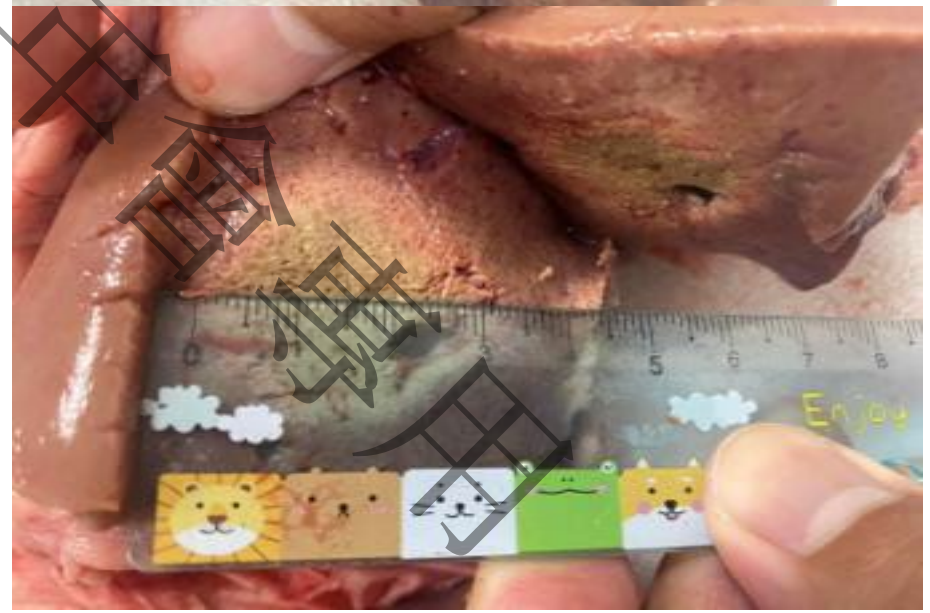



消融範圍測試





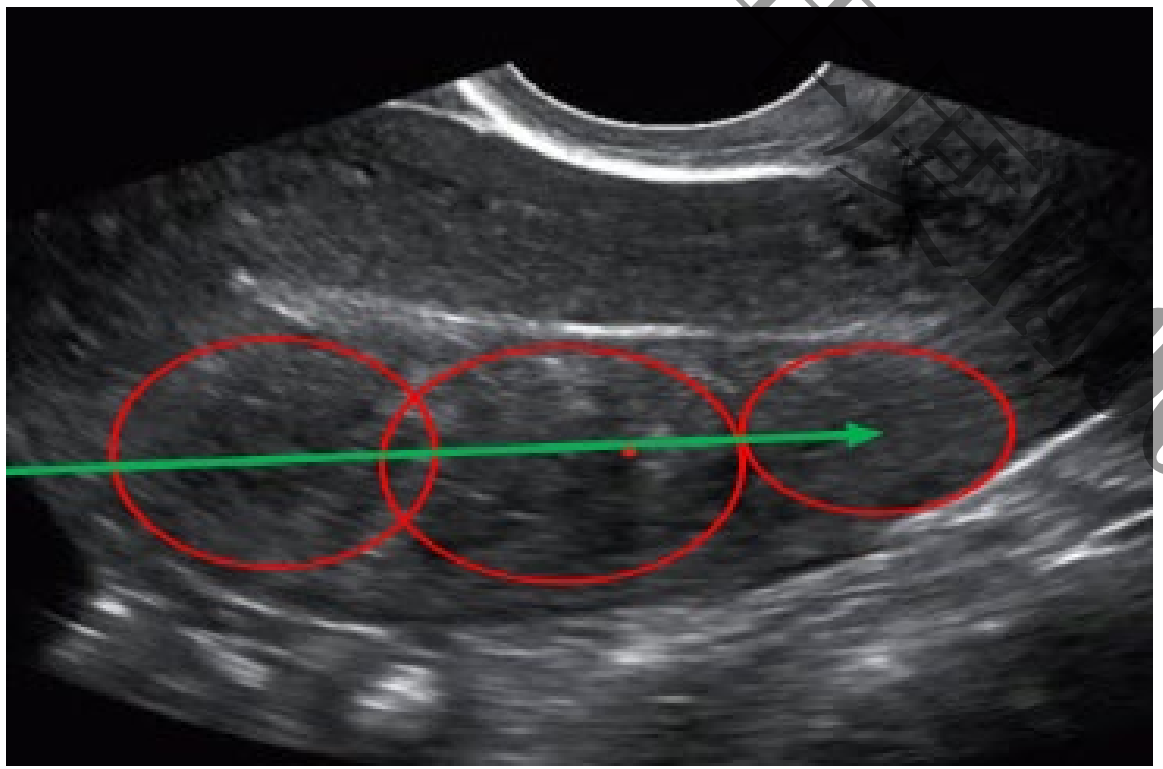
3.5cm



3.1cm

使用100W, 3mins, 消融範圍3.1cm x 3.5cm測試

Adenomyosis



肌腺症消融進針示意圖

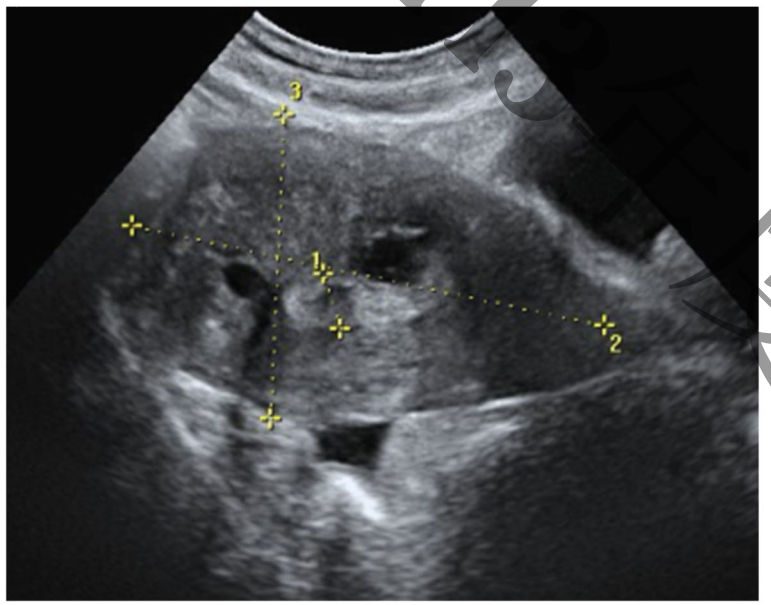
天線退針距離的計算:

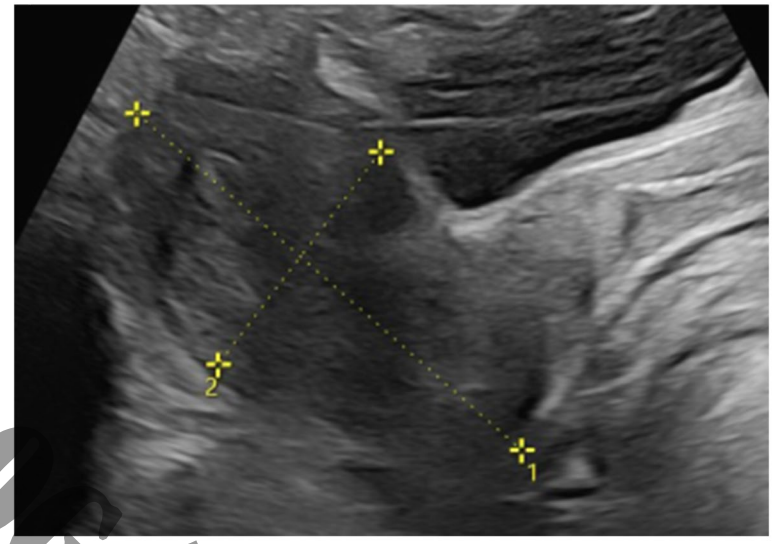
→ 如果第一球選擇100w, 1min, 2.3(W)*2.8(H) (Tip 0.3)

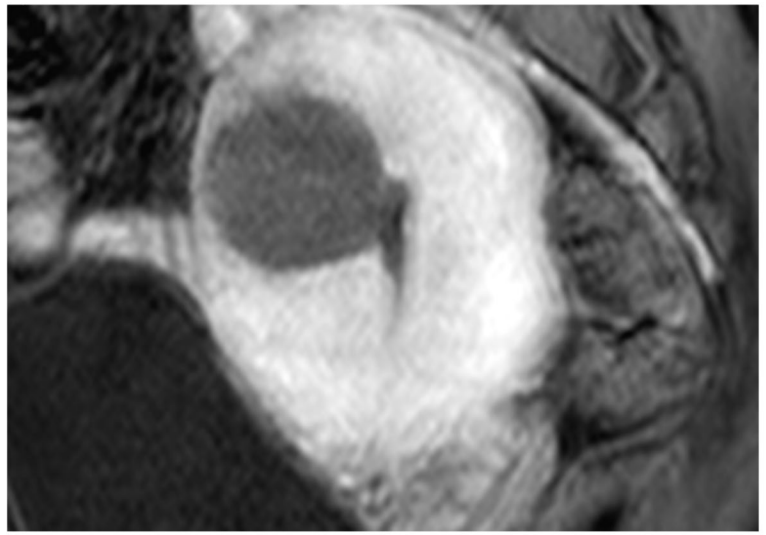
→ 2.8-0.3=2.5cm (消融範圍到針2.5刻度)

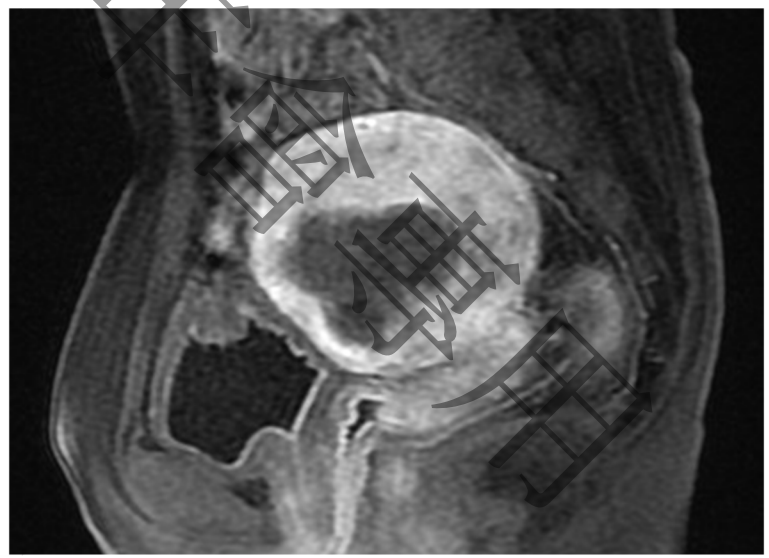
→ 所以至少可以退2.5cm

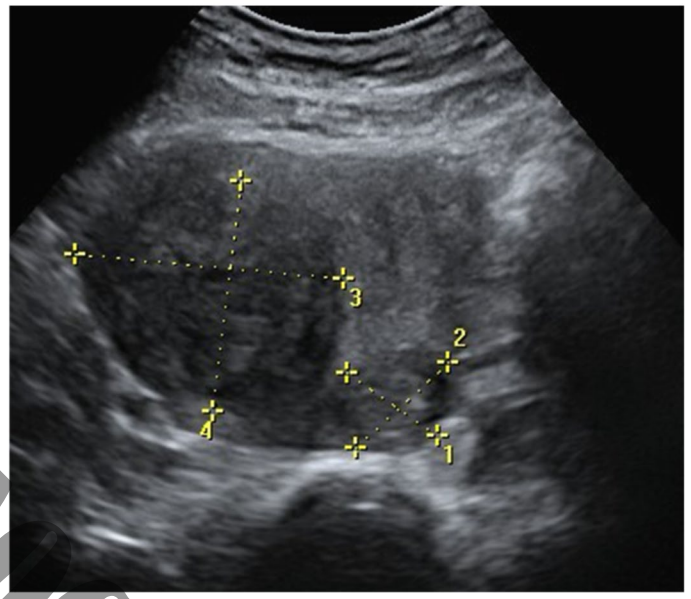
Can we use sonography to evaluate the ablation zone?

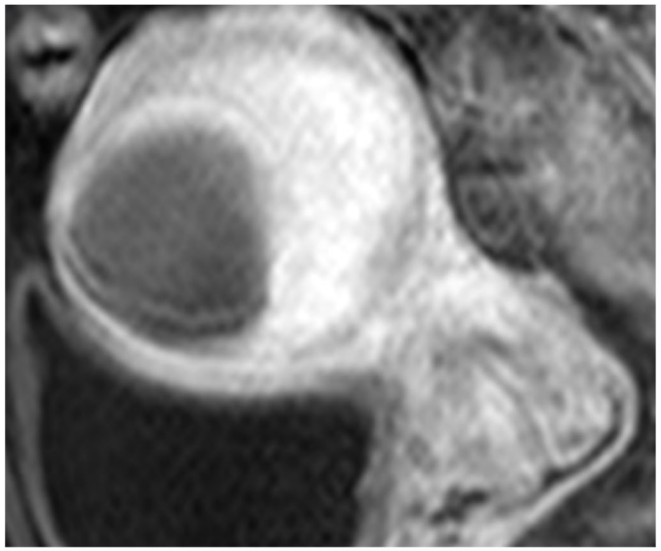


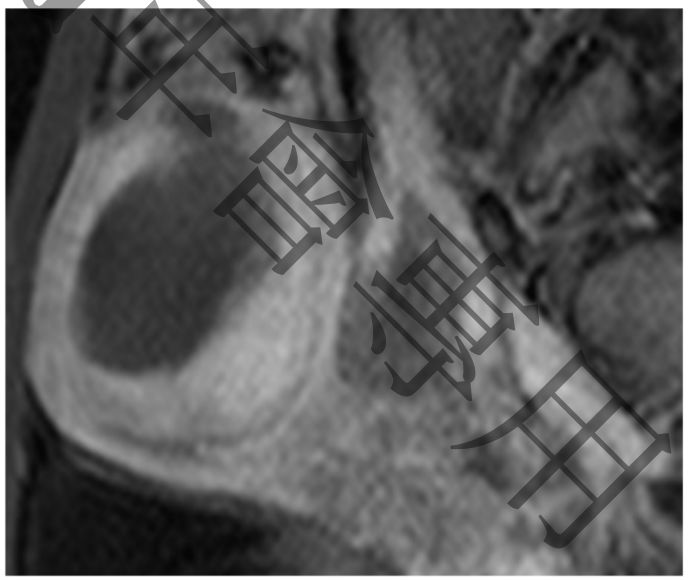




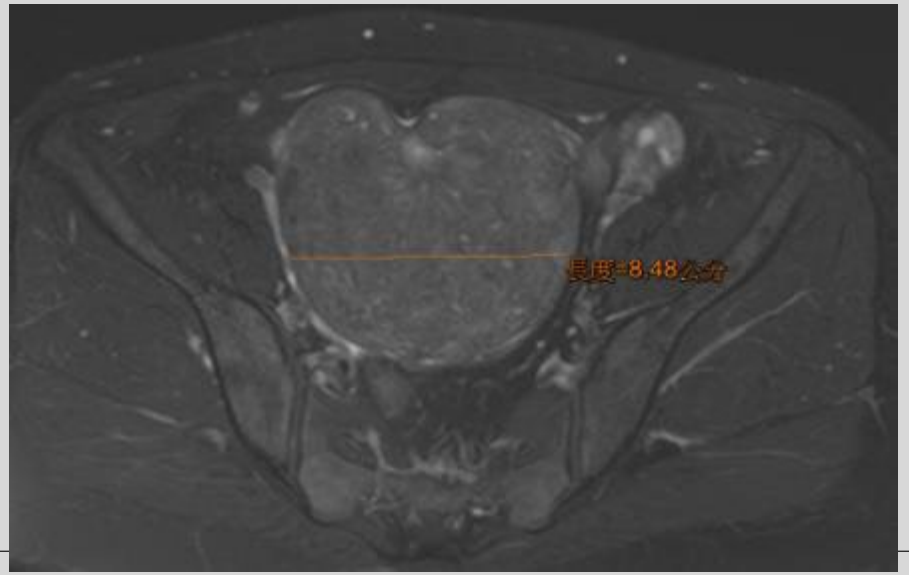




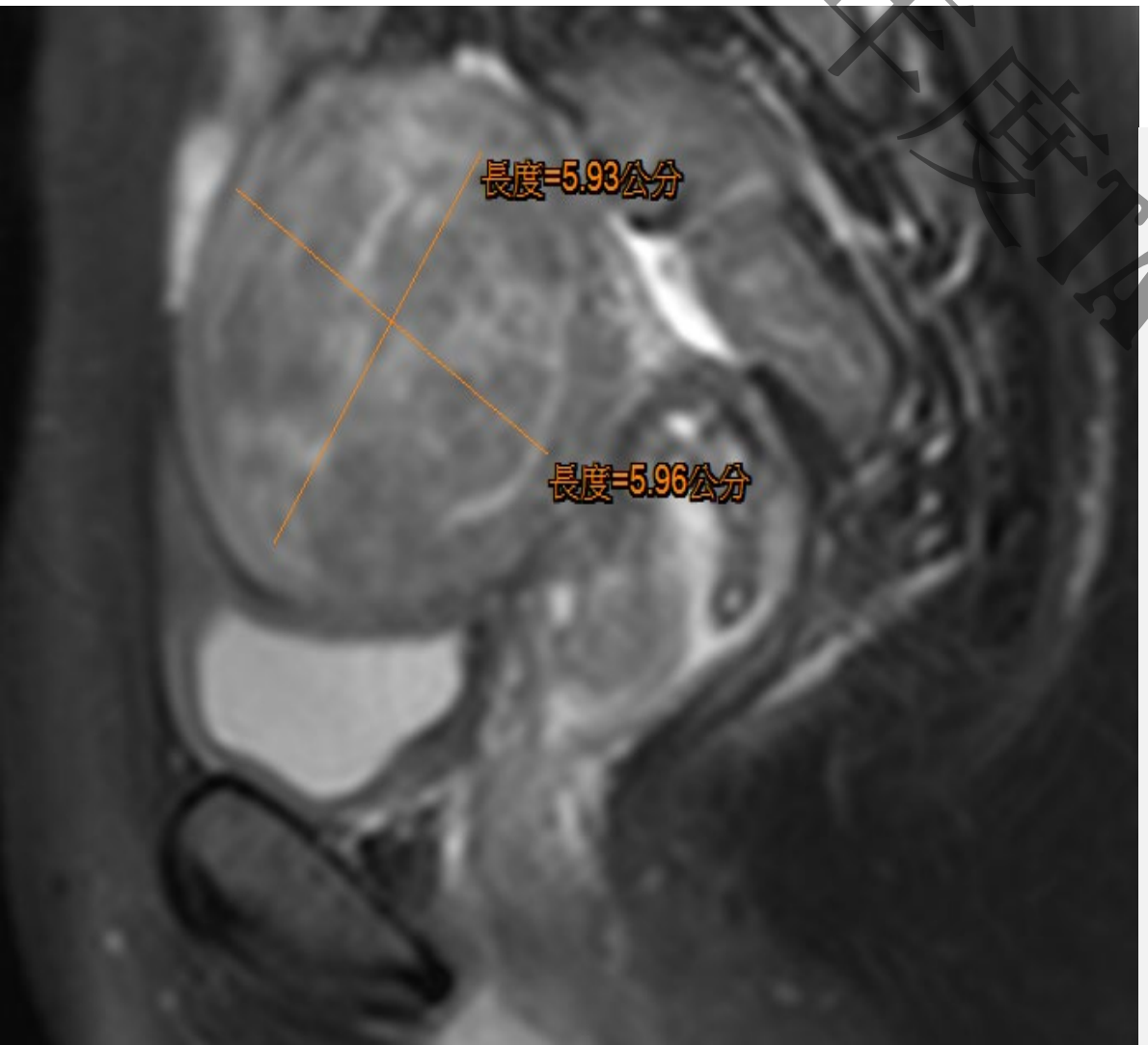




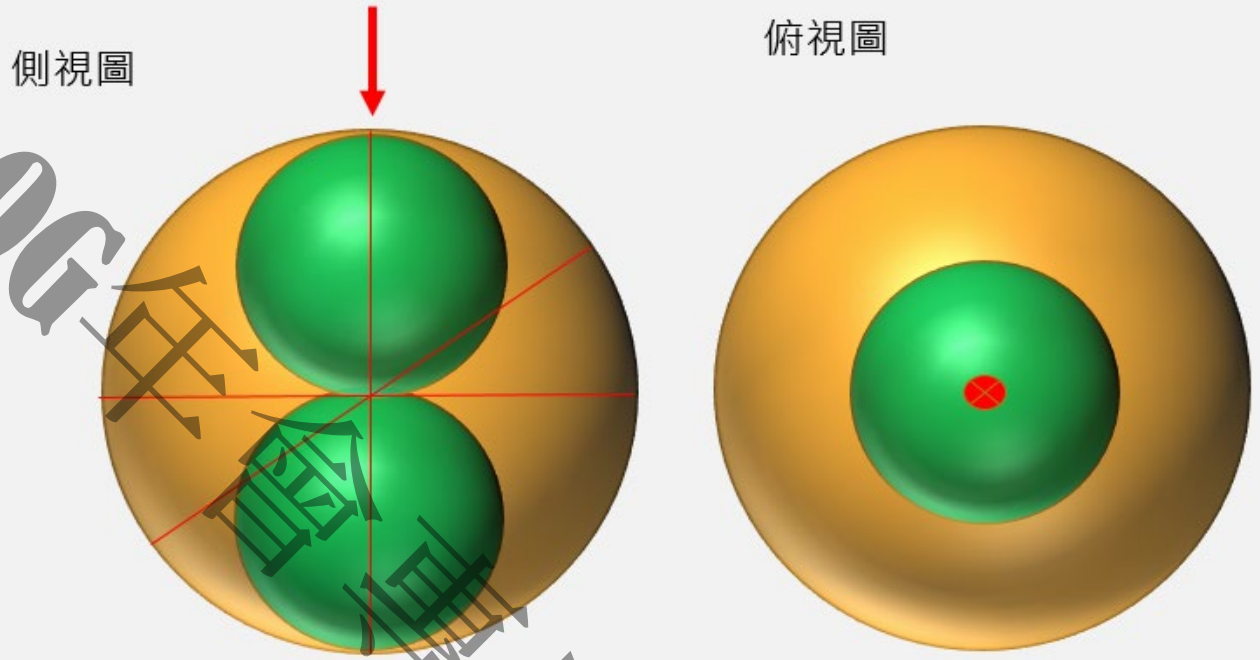
術前根據影像規劃消融路徑



術前根據影像規劃 — Leiomyoma



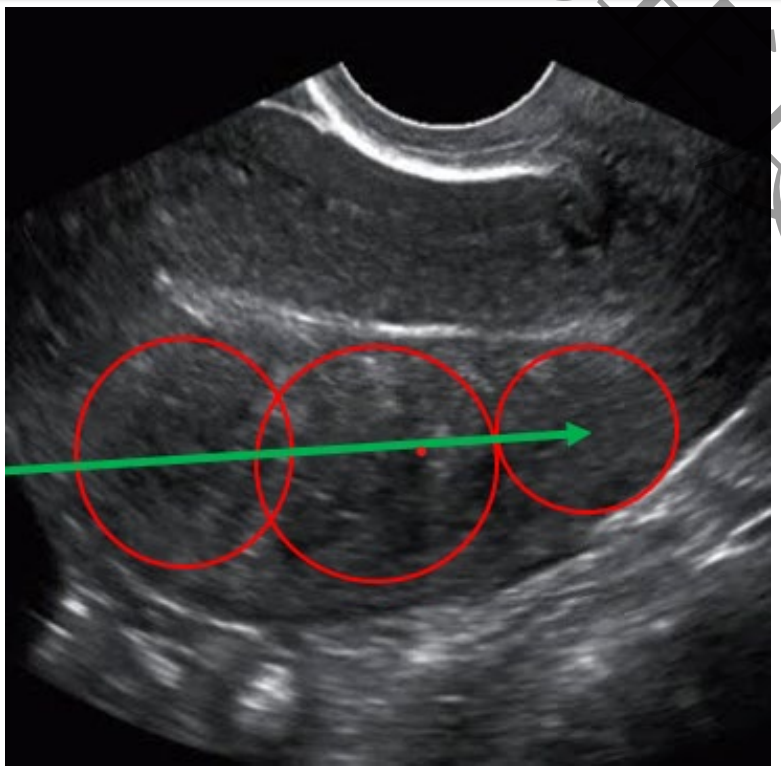
消融路徑的規劃-- 子宮肌瘤

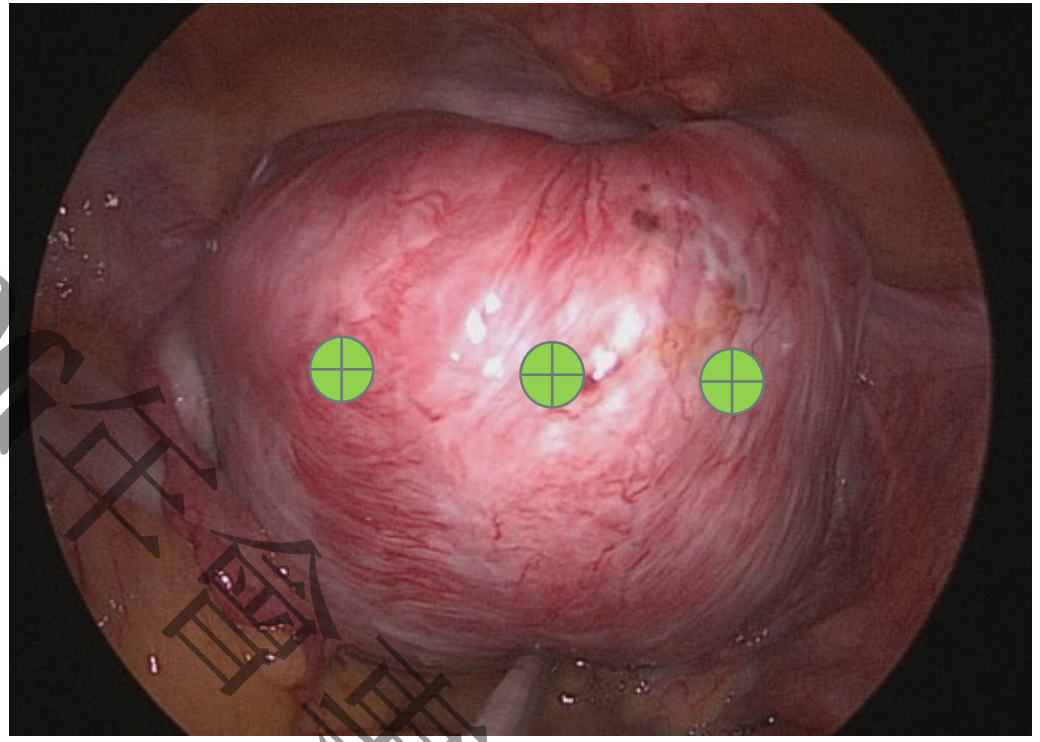


以直徑8公分的肌瘤示範

最大消融4.2*3.6cm
以直徑4公分的消融體積為範例

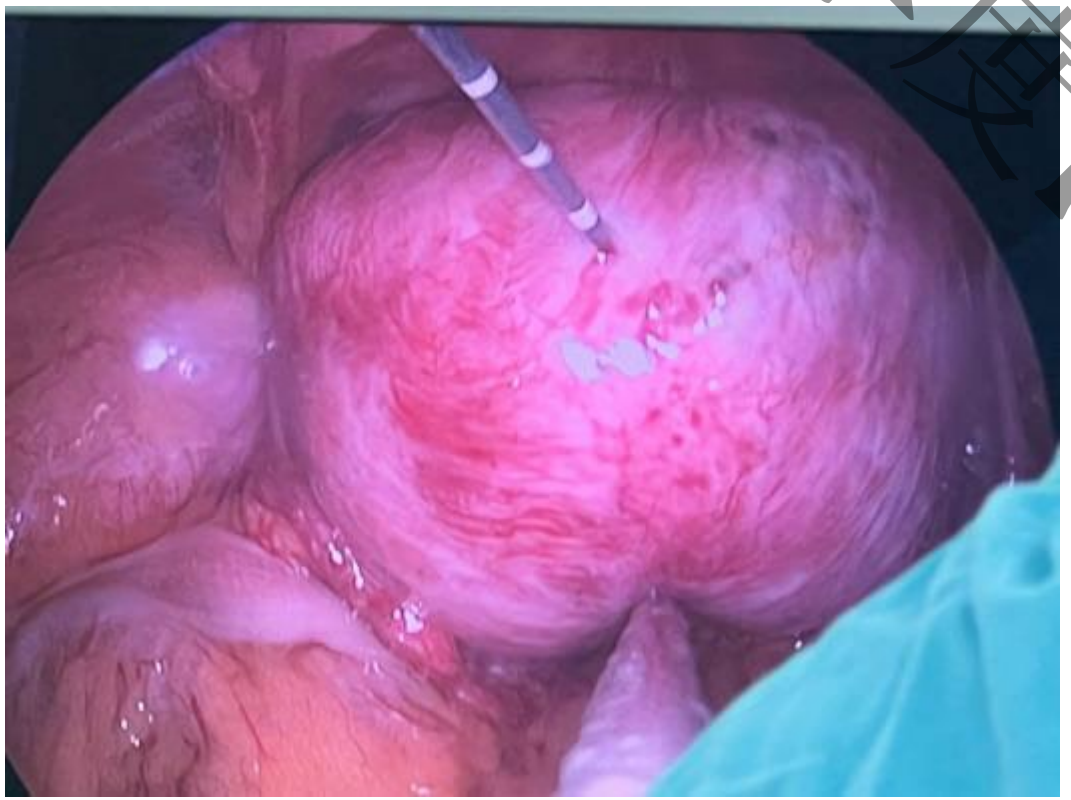
消融路徑的規劃 — Adenomyosis





肌腺症消融進針示意圖

消融天線進針及調整



海扶寶寶>>？？寶寶


吳宜蓁, 07/13/1983
RAB4-8-D/OB
MI 0.9
0120437 GA=12w4d
13.6cm / 1.4 / 15Hz
TIs 0.4
01/14/2017
LOWER EXTREMITIES


Voluson™
E8
Exp
吳宜蓁, 07/13/1983
RAB4-8-D/OB
MI 0.8
DIANTHUS MFM CLINIC HN 2F-6
0120437 GA=12w4d
12.0cm / 1.0 / 28Hz
TIs 0.4
01/14/2017
9:56:37 PM
Surface 2
Qual Max
B44°/V45°
Mix40/60
SRI 3D 3
3D Static
3D

KMUH MWA Study

Materials and methods

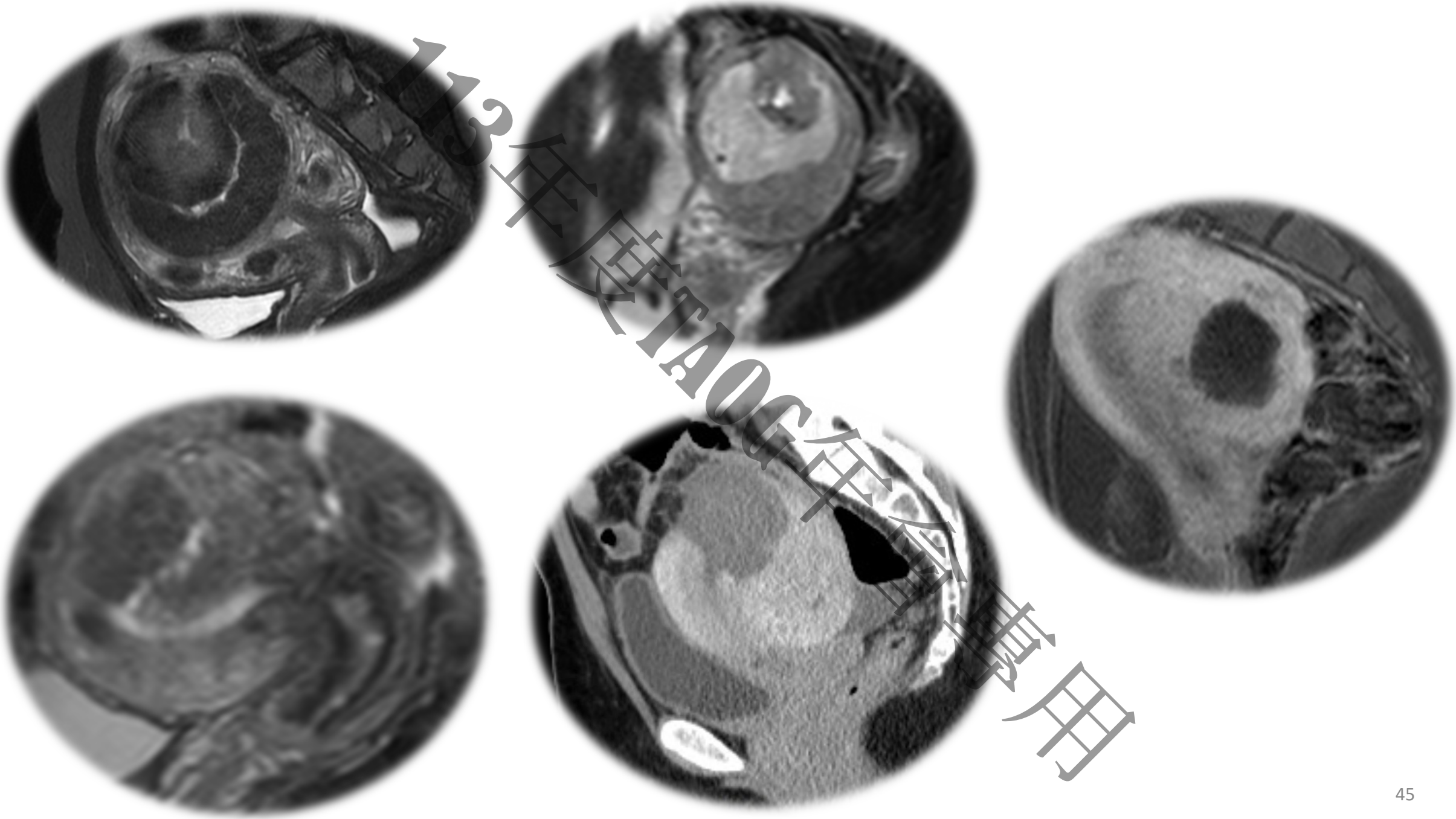
- We had included
  - 13 patients with symptomatic uterine myomas.
  - 7 patients with symptomatic adenomyosis.
- All patients underwent laparoscopic-assistant ultrasound-guided MWA from 2021/11 to 2022/6.
  - Contrast-enhanced MRI was performed before and 3 months after operation.
  - VAS, PBAC, UFS-QOL were recorded before and at 3 and 6 months after ablation.

Results

	0M	1M	3M	6M	P-vaule		
					1M	3M	6M
VAS	6.40±2.98	3.89±2.90	2.70±1.52	2.13±2.20	0.0116	0.0001	<.0001
PBAC	64.10±31.21	36.30±22.21	33.60±29.46	35.60±24.90	0.0024	0.0029	0.0028
UFS_QOL	51.60±18.93	39.13±19.77	28.85±22.06	27.08±20.17	0.0487	0.0012	0.0003

Results

	Myoma n= 13					Adenomyosis n= 7				
	Pre	1m	Pvalue*	3m	Pvalue*	Pre	1m	Pvalue*	3m	Pvalue*
Treatment time (min)	19.6±12.3					15.8±6.6				
Volume(ml)	102.0±116.3			69.1±93.6	< 0.01*	141.3±102.5			82.8±49.0	0.06
Regression rate(%)				33.4±20.5					36.0±22.1	
Change in UFS-QOL	48.5±18.9	40.5±16.6	0.02*	28.9±17.1	0.03*	57.3±19.2	37.8±26.9	0.03*	39.9±31.8	0.07
Change in PBAC	46.0±19.6	37.2±22.4	0.08	30.8±20.3	0.02*	73.6±45.6	38.7±22.6	0.05	34.3±34.1	0.05
Change in VAS	6.1±2.9	3.9±2.7	0.07	3.4±2.5	0.04*	7.0±3.3	3.9±3.5	0.07	3.3±3.5	0.46



2022年7月修正手術方式後 21 - 40th 例

N=20

	0M	1M	3M	6M	p value*		
					1M	3M	6M
VAS	8.5±2.40	1.5±2.44	0.8±1.73	1.1±2.11	<0.001	<0.001	<0.001
PBAC	51.4±14.95	22.0±18.66	12.1±9.41	12.3±8.02	<0.001	<0.001	<0.001
UFS-QOL-total	50.2±11.66	26.1±12.62	14.3±13.43	14.2±14.61	<0.001	<0.001	<0.001
UFS-QOL-1-8	18.6±4.99	10.4±6.01	6.2±6.42	6.0±6.60	<0.001	<0.001	<0.001
UFS-QOL-9-24	34.3±11.9	18.4±9.67	9.4±9.08	8.4±10.92	<0.001	<0.001	<0.001
UFS-QOL-26-37	19.5±10.27	8.7±7.77	4.9±7.46	5.9±6.54	<0.001	<0.001	<0.001

		0M	1M	3M	6M	Success rate
Learning curve (N=20)	VAS	6.40±2.98	3.89±2.90	2.70±1.52	2.13±2.20	
	PBAC	64.10±31.21	36.30±22.21	33.60±29.46	35.60±24.90	50 %
	UFS_QOL	51.60±18.93	39.13±19.77	28.85±22.06	27.08±20.17	
Beyond Learning curve (N=20)	VAS	8.5±2.40	1.5±2.44	0.8±1.73	1.1±2.11	
	PBAC	51.4±14.95	22.0±18.66	12.1±9.41	12.3±8.02	90 %
	UFS_QOL	50.2±11.66	26.1±12.62	14.3±13.43	14.2±14.61	

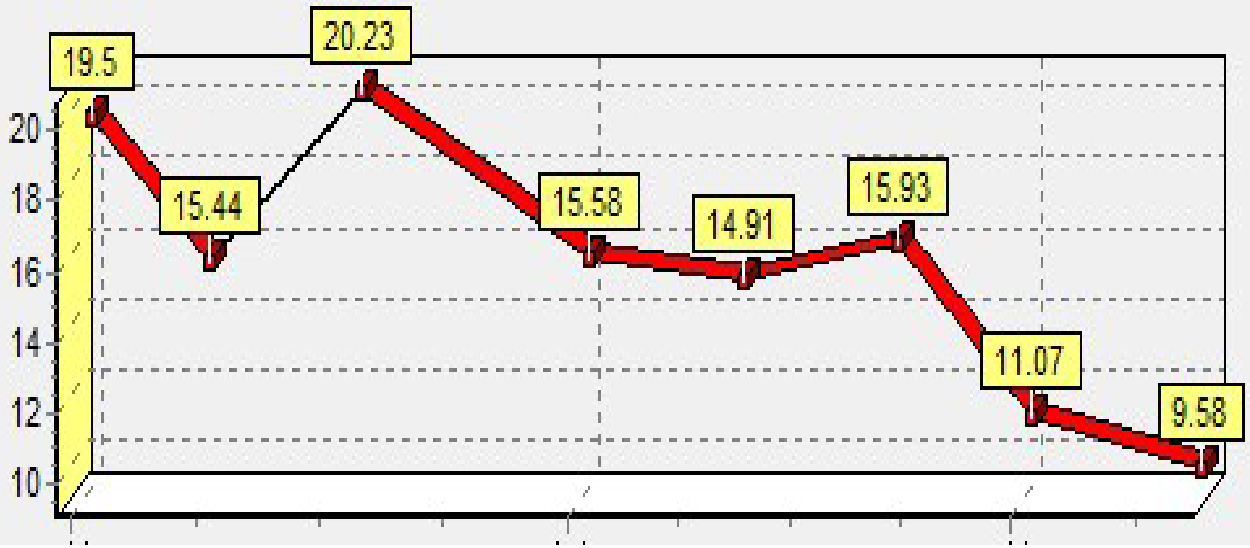
特殊案例分享

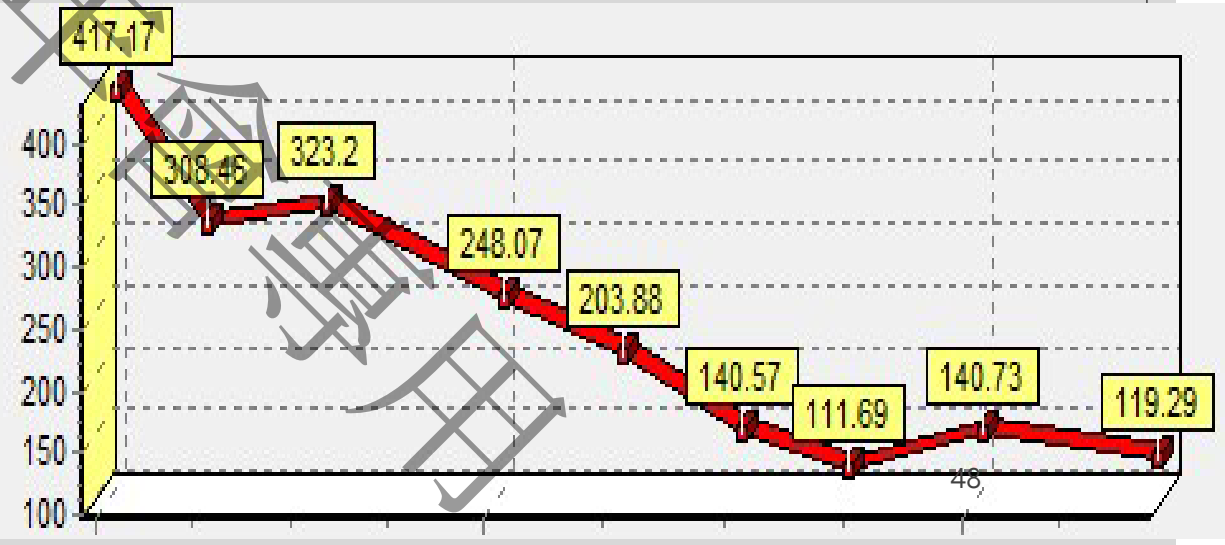
38 y/o female,
Post. Intramural myoma, Lt endometrioma,
Fertility desire

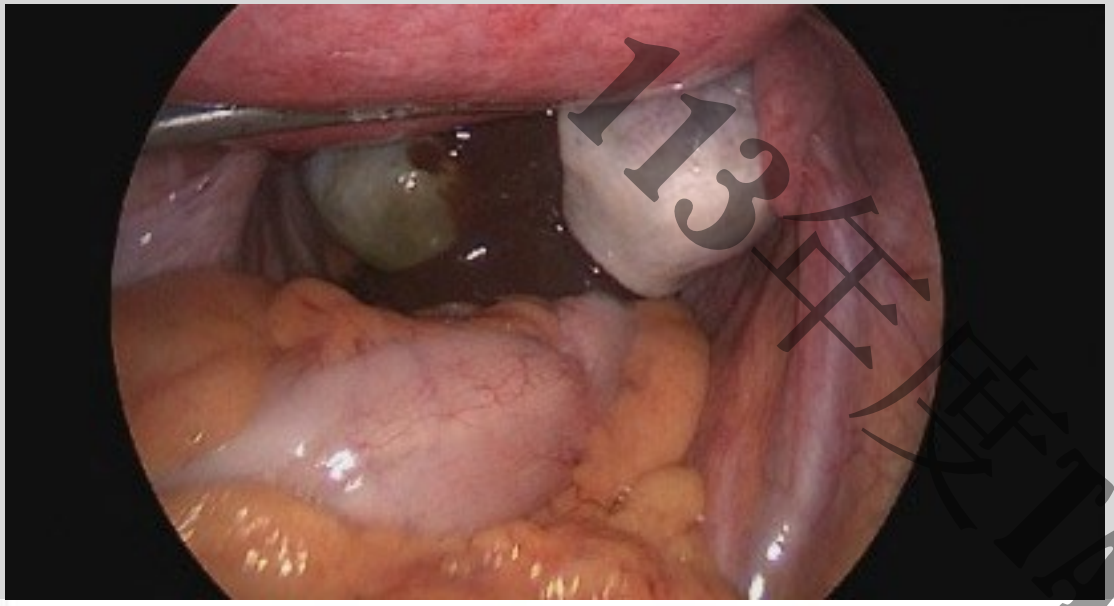
6/30
MWA

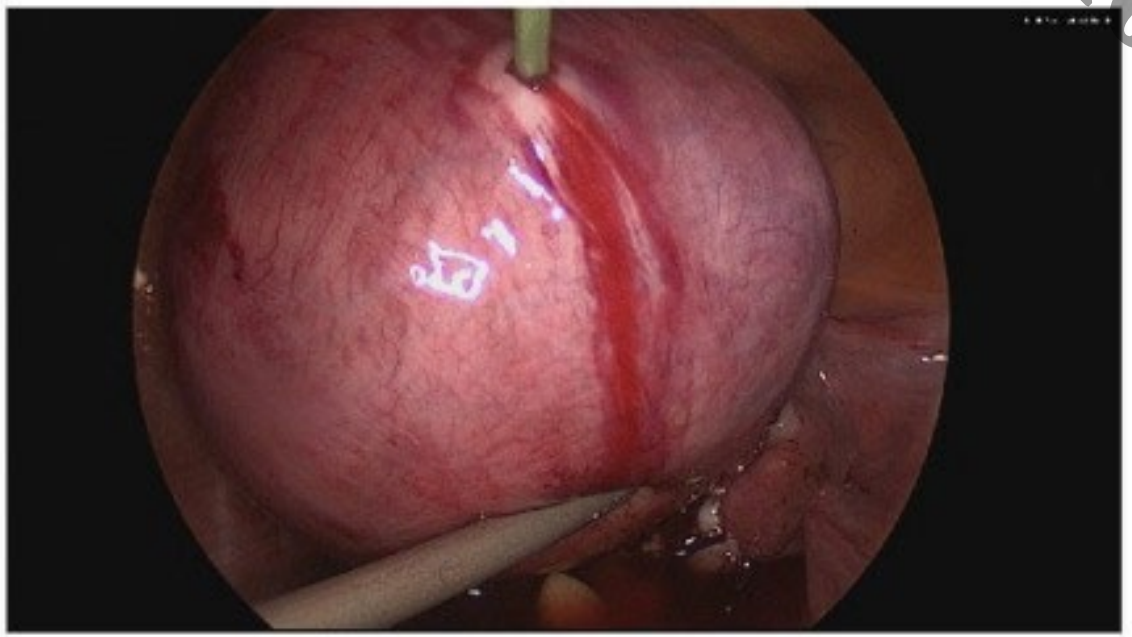
Fever since
8/11

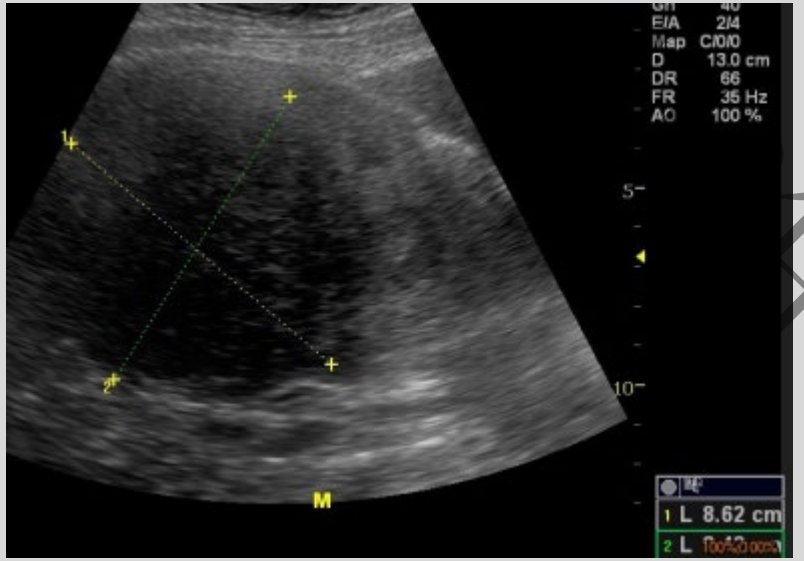
Hospitalizat
ion 8/14-9/2







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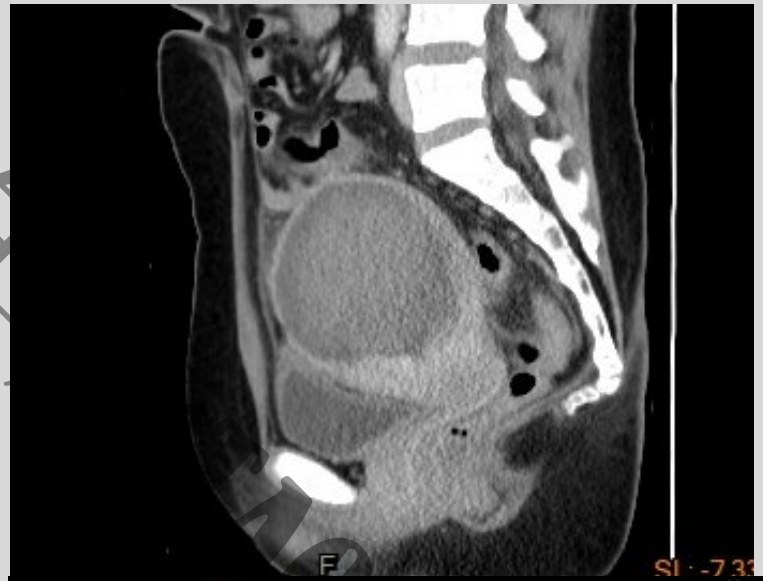
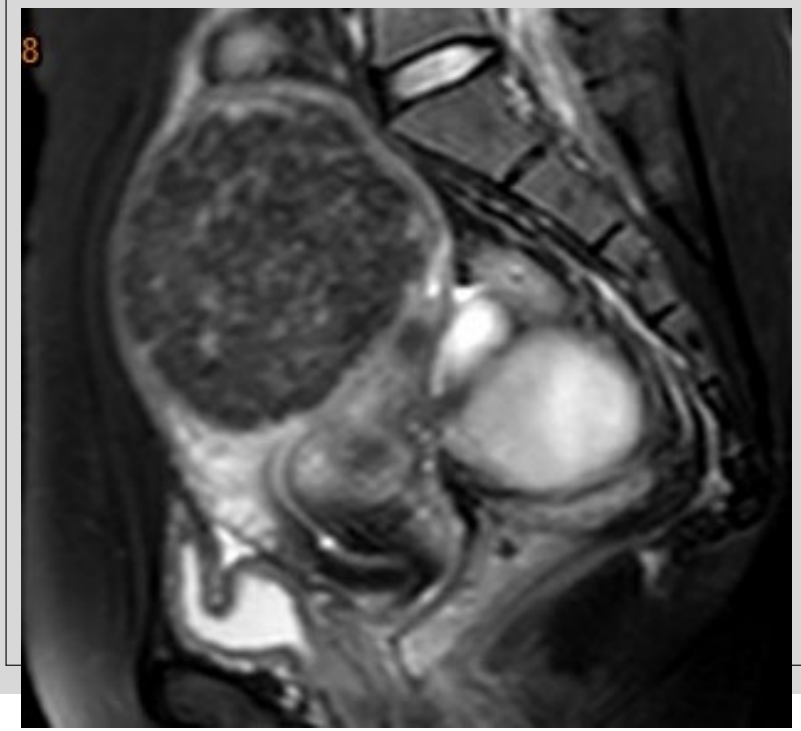
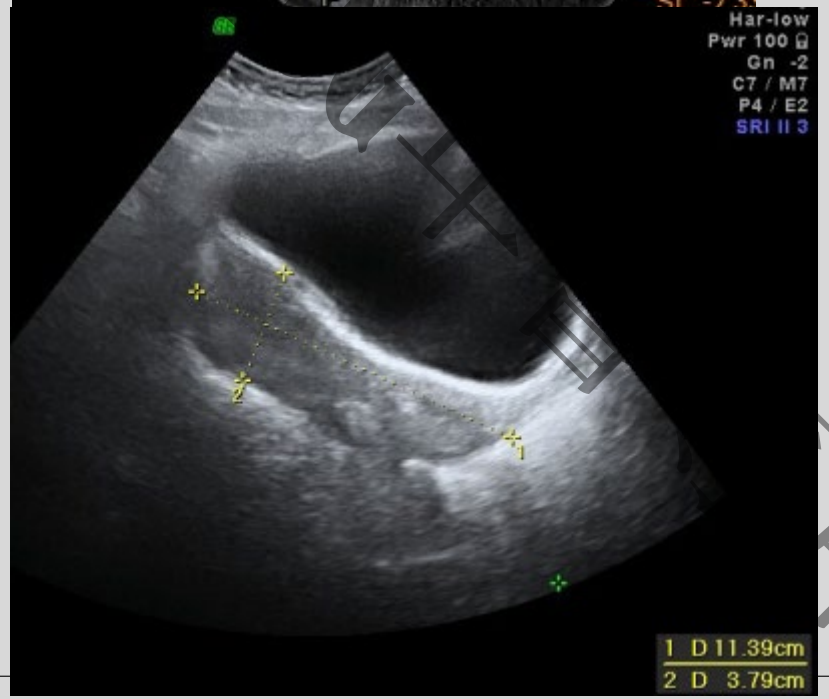
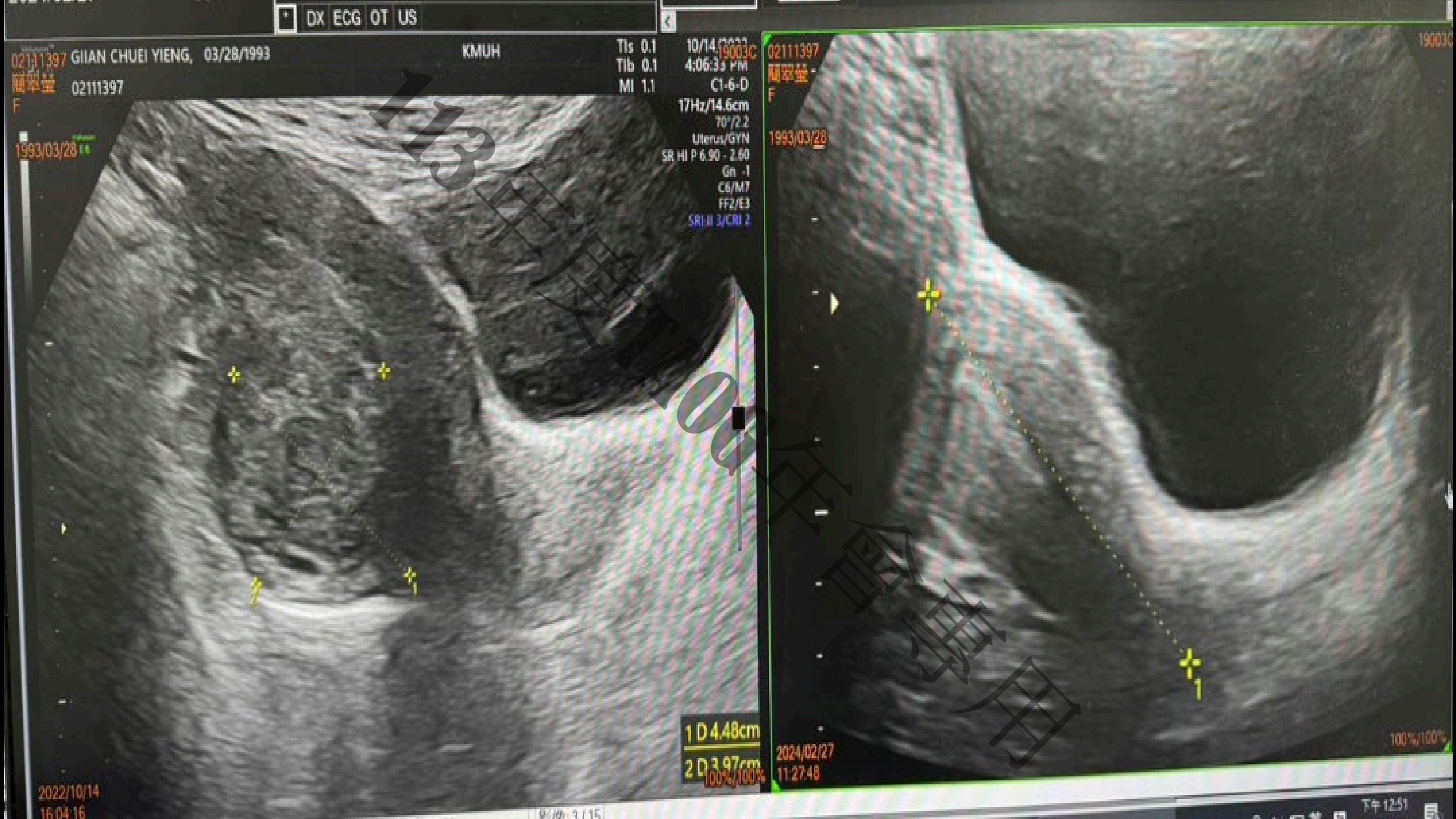
Map C/0/0
D 13.0 cm
DR 66
FR 35 Hz
AO 100 %
M
1 L 8.62 cm





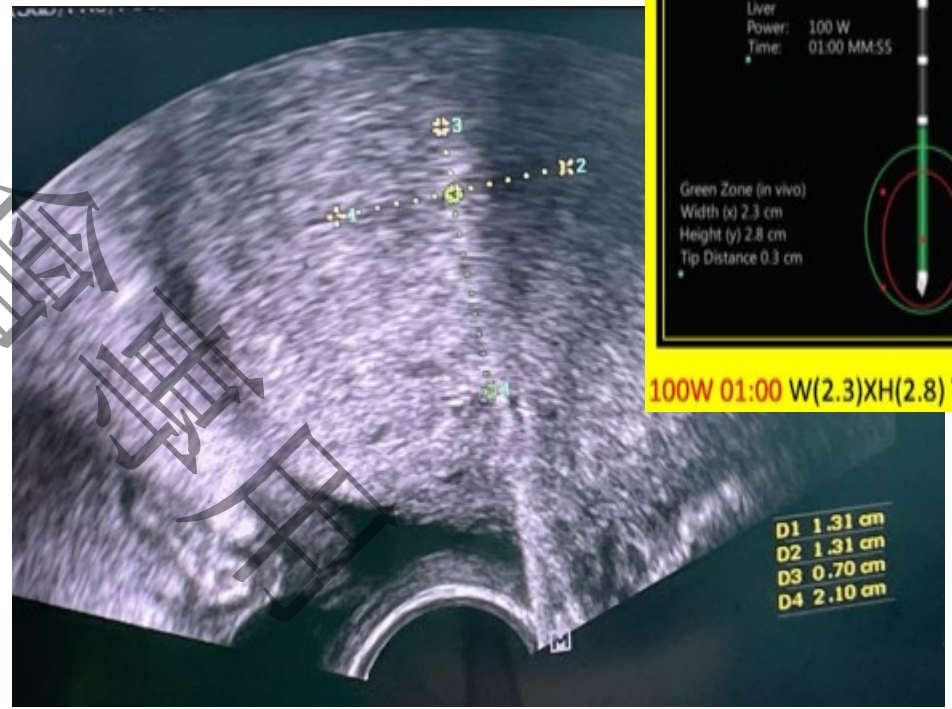

Har-low
Pwr 100
Gn -2
C7 / M7
P4 / E2
SRI II 3
1 D 11.39cm
2 D 3.79cm

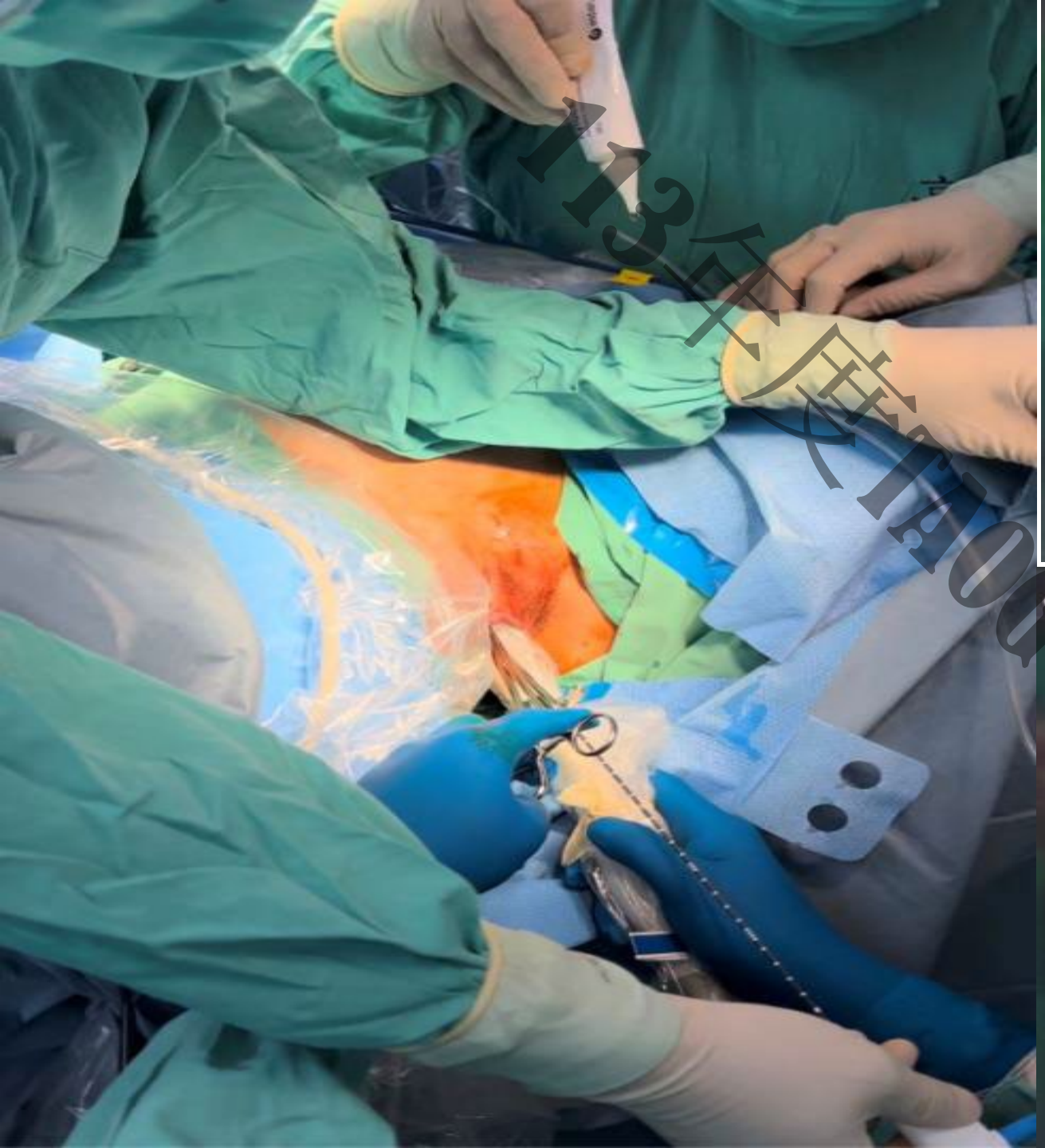

DX ECG OT US
02111397 GIIAN CHUEI YIENG, 03/28/1993
KMUH
02111397
1993/03/28
Tis 0.1
Tib 0.1
MI 1.1
C1-6-D
17Hz/14.6cm
Uterus/GYN
1 D 4.48cm
2 D 3.97cm
2022/10/14
16:04:16
02111397
1993/03/28
2024/02/27
11:27:48
100%/100%

TVS-guided transvaginal MWA (NOTES MWA)

Steps

- ✓ Patient in low lithotomy position
- ✓ Artificial ascites (Inserted 200ml of N/S by surgi-needle via umbilicus)
- ✓ Insert needle via posterior fornix, guided by TVS with guiding needle set
- ✓ Ensure the target zone





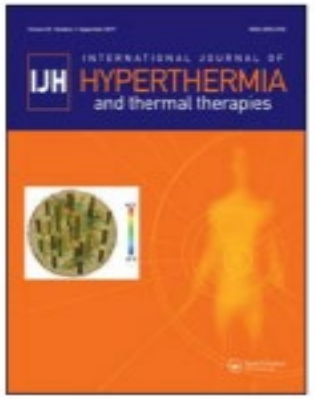
LESS MWA

Paper review

文獻資料

參考文獻及出處	文獻重點
Unplanned pregnancy after ultrasound-guided percutaneous microwave ablation of uterine fibroids: A follow-up study Zhang Bing-song, Zhang Jing, Han Zhi-yu, Xu Chang-tao, Xu Rui-fang, LiXiu-mei & Liu Hui **Scientific Reports | 6:18924 | DOI: 10.1038/srep18924**	After UPMWA treatment for uterine fibroids, patients may conceive naturally, the impact of the procedure on fertility and pregnancy outcomes is worthy of further prospective study in larger sample. 使用超音波導引微波消融微創手術，病患能可自然受孕，但還需更多樣本數及前瞻性報告證實其影響及相關性 Rabinovici et al.[24] reported 54 pregnancies in 51 women after MRI-guided HIFU for uterine fibroids in 13 sites in seven countries. They reported that live births occurred in 41% of pregnancies, with a 28% spontaneous abortion rate, an 11% rate of elective pregnancy termination, and 20% of the pregnancies went beyond 20 gestational weeks. However, the ablation rate of the fibroids in that study was just over 40%, and 24% of the patients received secondary treatment to treat the fibroids. 在Rabinovici 54位病例報告中顯示，其中51位病患接受海扶消融治療後，有懷孕41%，自然流產28%，11%人工流產，再治療率24%。 UPMWA of uterine fibroids had ablation rates up to 88.8± 15.8%. Moreover, after 3, 6, and 12 months of treatment, the fibroids shrank by an average of 61.8%, 78.7%, and 93.1%. 本研究中的微波消融 3/6/9的月的子宮肌(腺)瘤體積收縮，平均分別為61.8% / 78.7% / 93.1%

Transvaginal ultrasound- and laparoscopy-guided percutaneous microwave ablation for adenomyosis: preliminary results



International Journal of Hyperthermia 2019

Jian-Xin Liu [a], Jue-Ying Li[a], Xiao-Yu Zhao[a], Qing-Hua Zhang[b], Ying Cao[b], Xiu-Juan Huang[a], Xiao-Feng Sun[a], Yuan-Liang Xie[c], Shu-Tong Zhang[c], and Shun-Shi Yang[a]

- ✓ **2015/05 ~ 2017/10, 70 patients with symptomatic adenomyosis**
- ✓ **Uterine volume, lesion volume, symptom severity score (SSS) and visual analog scale (VAS) score before and at 1/6/12 months after PMWA were recorded.**

Table 1. Baseline information.

Age	42 ± 6
Abdomen or pelvic surgery history (*n*)	26
Uterine volume (cm^3)	213.5 ± 88.6
Lesion volume (cm^3)	73.7 ± 35.4
Symptom (*n*)	
Dysmenorrhea	70
Menorrhagia	53
Bulk pressure	21
Symptom score	
SSS	21.6 ± 6.3
VAS	7.1 ± 0.8

- ✓ **100% success rate without major complication**
- ✓ **84% (43) showed improvement of dysmenorrhea**
- ✓ **78% (40) showed improvement of menorrhagia**
- ✓ **TVS and laparoscopy-guided PMWA is an effective technique and could be an option for the treatment of adenomyosis**

Table 2. Uterine volume, lesion volume, SSS and VAS score before and after microwave ablation of group 1.

	Pre-ablation	1 M Post-ablation	6 M Post-ablation	12 M Post-ablation
Uterine volume measured with MRI (cm^3)	213.5 ± 88.6	153.2 ± 48.3[a]	105.3 ± 47.9[a]	95.5 ± 44.6[a]
Lesion volume measured with MRI (cm^3)	73.7 ± 35.4	48.1 ± 25.4	28.7 ± 19.9[a]	16.5 ± 8.6[ab]
SSS	21.6 ± 6.3	16.5 ± 5.5[a]	13.5 ± 5.1[a]	8.6 ± 3.7[ab]
VAS	7.1 ± 0.8	4.7 ± 0.6	2.1 ± 0.7[a]	1.3 ± 0.4[a]

[a]Compared with the value of pre-ablation, $p < .01$.
[b]Compared with the value of latest time, $p < .01$.

Long term follow-up of uterine fibroids treated with microwave ablation: an up to 3-year observational study of volume, regrowth and symptoms

Marie Beermann, Gudny Jonsdottir, Annika Cronisoe, Klara Hasselrot & Helena Kopp Kallner (2022)

International Journal of Hyperthermia, 2022

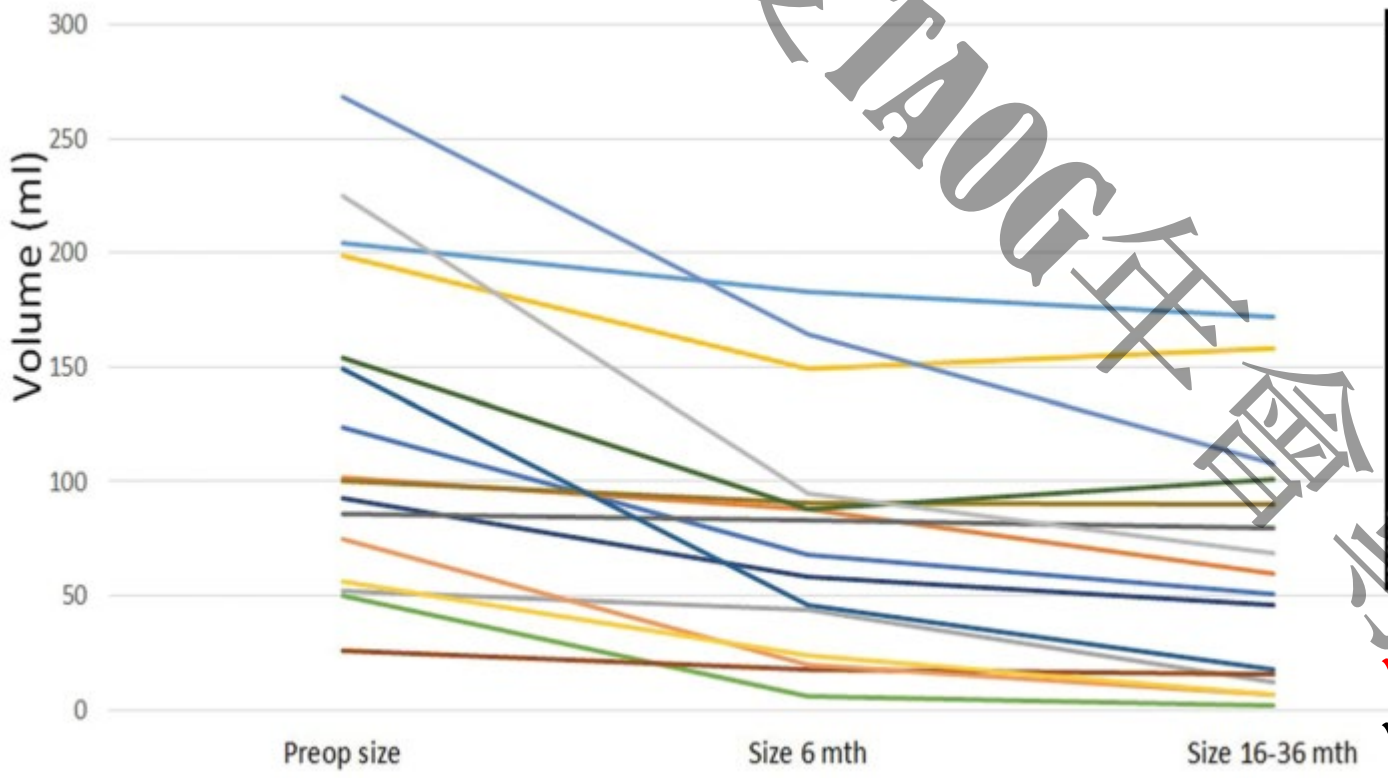
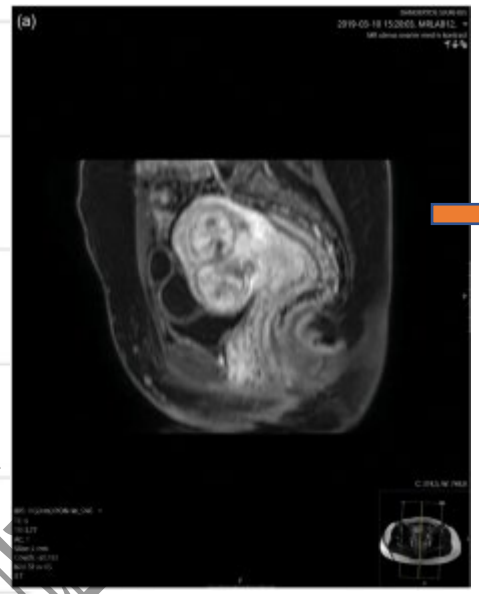
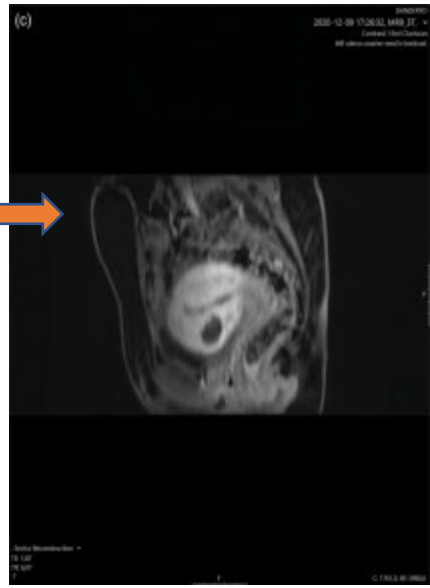


Figure 2. Line plot showing per patient change of fibroid volume (ml) over time. Every line represents 1 patient ($n = 16$).





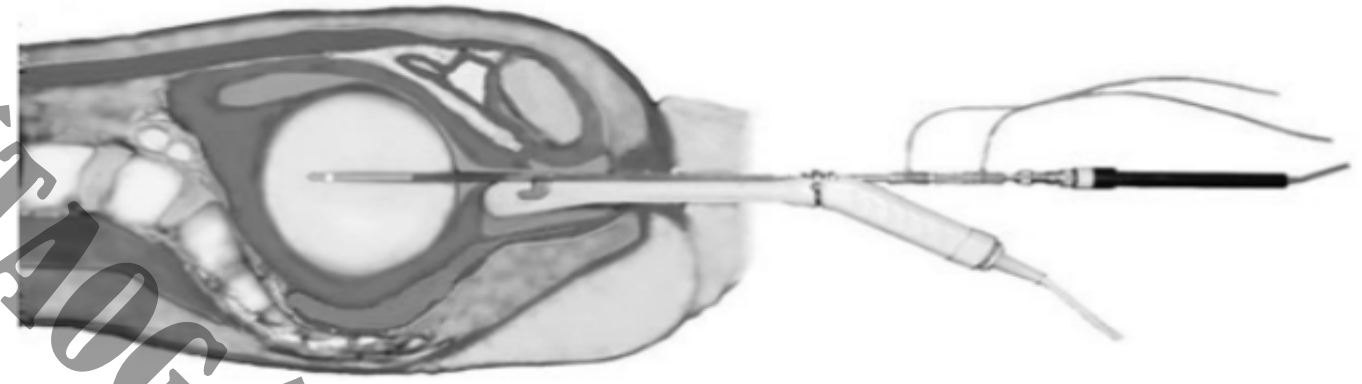
- ✓ **42 treated fibroids**
- ✓ **Treatment effect maintained for up to 36 months and continuous shrinkage**

Transcervical microwave myolysis for uterine myomas assisted by transvaginal ultrasonic guidance

Yasushi Kanaoka, Chika Yoshida, Takeshi Fukuda, Koji Kajitani and Osamu Ishiko

Department of Obstetrics and Gynecology, Osaka City University Graduate School of Medicine, Osaka, Japan

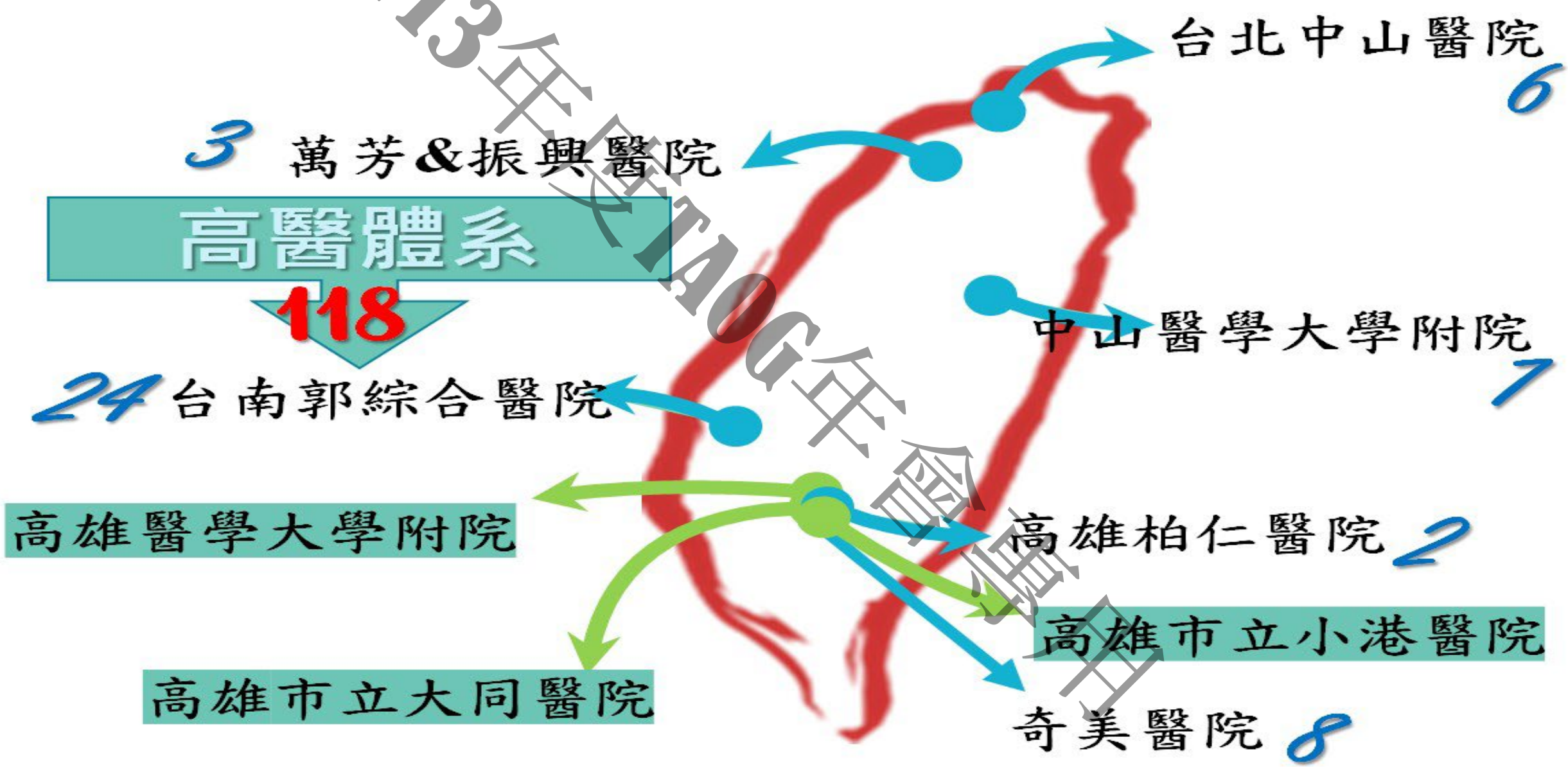
J. Obstet. Gynaecol. Res. Vol. 35, No. 1: 145–151, February 2009



- ✓ **10 patients, 40-48y/o, with a submucous or intramural myoma 4.0–7.5 cm in size causing menorrhagia**
- ✓ **Microwave endometrial ablation + TCMM (transcervical microwave myolysis) was done**
- ✓ **Shrinkage of the myoma was measured at 3 & 6 months after the operation**

- **9 patients with typical myomas. The size shrunk by 41–68% at 3 months and 37–69% at 6 months after operation.**
- **The other one patient with a 6.8 cm cellular leiomyoma, necrosis was limited to the neighborhood of the applicator tip. Shrinkage was 17% at both 3 and 6 months. She needs a second operation.**
- **No remarkable complications were encountered.**
- **Trans-Cx MWA seems to be applicable as a low-invasive treatment for a typical myoma.**

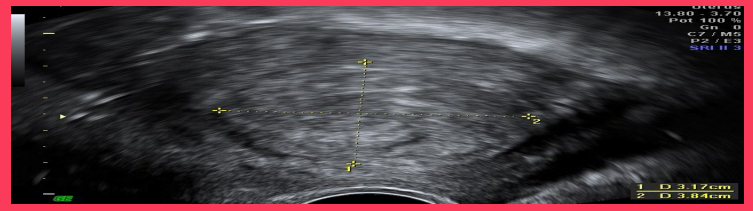
目前微波刀分布醫院例數



How to Approach?

- Transvaginal Approach
- Laparoscopic Approach
- Hysteroscopic Approach

Initial Ultrasound

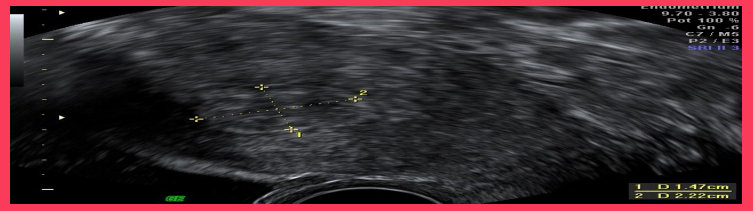


37x32x35 mm (21.54 cm³) 8 days total bleeding, 6 HMB

1 Month

26X28X22 mm (8.32 cm³) 62%↓
6 HMB, 4 HMB (33%)

6 Months



18x20x19 mm (3.83 cm³) 83%↓
4 TB, 4 HMB (25%)

Product Specification

Specification \ Model name	starRFElectrode_Fixed	starRFElectrode_Bipolar	VMARFElectrode_V2type
Gauge	17G	17G	17G
Length	250mm,350mm	250mm,350mm	250mm,350mm
Active Tip	10-40mm	16mm,20mm	5-30mm,15-40mm

[References]

1. J Laparoendosc Adv Surg Tech A. 2019;29(12):1507-1517. Clinical Performance of Radiofrequency Ablation for Treatment of Uterine Fibroids: Systematic Review and Meta-Analysis of Prospective Studies.
2. J Laparoendosc Adv Surg Tech A. 2019;29(1):24-28. Transvaginal Radiofrequency Ablation of Myomas: Technique, Outcomes, and Complications.
3. Hum Reprod. 2011;26(3):559-63. Transvaginal ultrasound-guided radiofrequency myolysis for uterine myomas.

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ST-CA-UF(I) Rev.1 Nov, 2021

新式 Thermal Ablation 技術比較表

	Microwave (PMAT)	RFA	HIFU
手術時間	約 30 分鐘	約 50 分鐘	1~4 小時
治療原理	微波熱能治療	射頻消融(燒灼)治療	超音波聚焦
麻醉	鎮靜 or 麻醉	鎮靜 or 麻醉	鎮靜 or 麻醉
收費	13-15萬	約 5-7萬 (依醫院收費規範)	20~30萬
設備空間	小(可隨意移動，110V)	小(可隨意移動，110V)	大(需一個房間，需供水、電)
學習曲線	短	短	長
不適合的患者	凝血功能差者, 無適合的入針路逕	凝血功能差者, 無適合的入針路逕	蟹足腫、抽脂手術、位置不佳
消融範圍	精準球型消融	消融範圍不穩定, 會受到血流影響	可控
電燒貼片需求	無	需要, 有電燒傷疑慮	有燒燙傷疑慮
組織反應	不受組織阻抗影響	受組織阻抗影響	受組織阻抗影響
手術效果 (台灣數據)	縮小50%(三個月追蹤高醫)	NA	縮小50%~70% (六個月追蹤 高醫2018.11, 中山醫2019.5)
臨床文獻手術效果 (12個月)	縮小85.3%	縮小71%	縮小37.7%
併發症	下腹悶熱、分泌物	下腹悶熱、分泌物	皮膚燙傷、腸子受損
術前評估	超音波、不一定要 MRI	超音波、MRI	MRI、超音波

Conclusions

- MWA is a simple, repeatable, precise and promising technique for treating uterine fibroids and adenomyosis with low learning curve.

- It is very effective for dysmenorrhea and recover rapidly after treatment.

- It needs strict patient selection, evaluation and preoperative planning.

- Transvaginal MWA (NOTES MWA) is feasible and effective
  - ✓ Posterior lesion above 4cm for women with fertility desire
  - ✓ EM ablation for women without fertility desire

建議先不動手術，還是吃荷爾蒙藥控制

《謝謝暖男醫師 #顏志峰醫師》

因荷爾蒙藥，真的讓我很不舒服

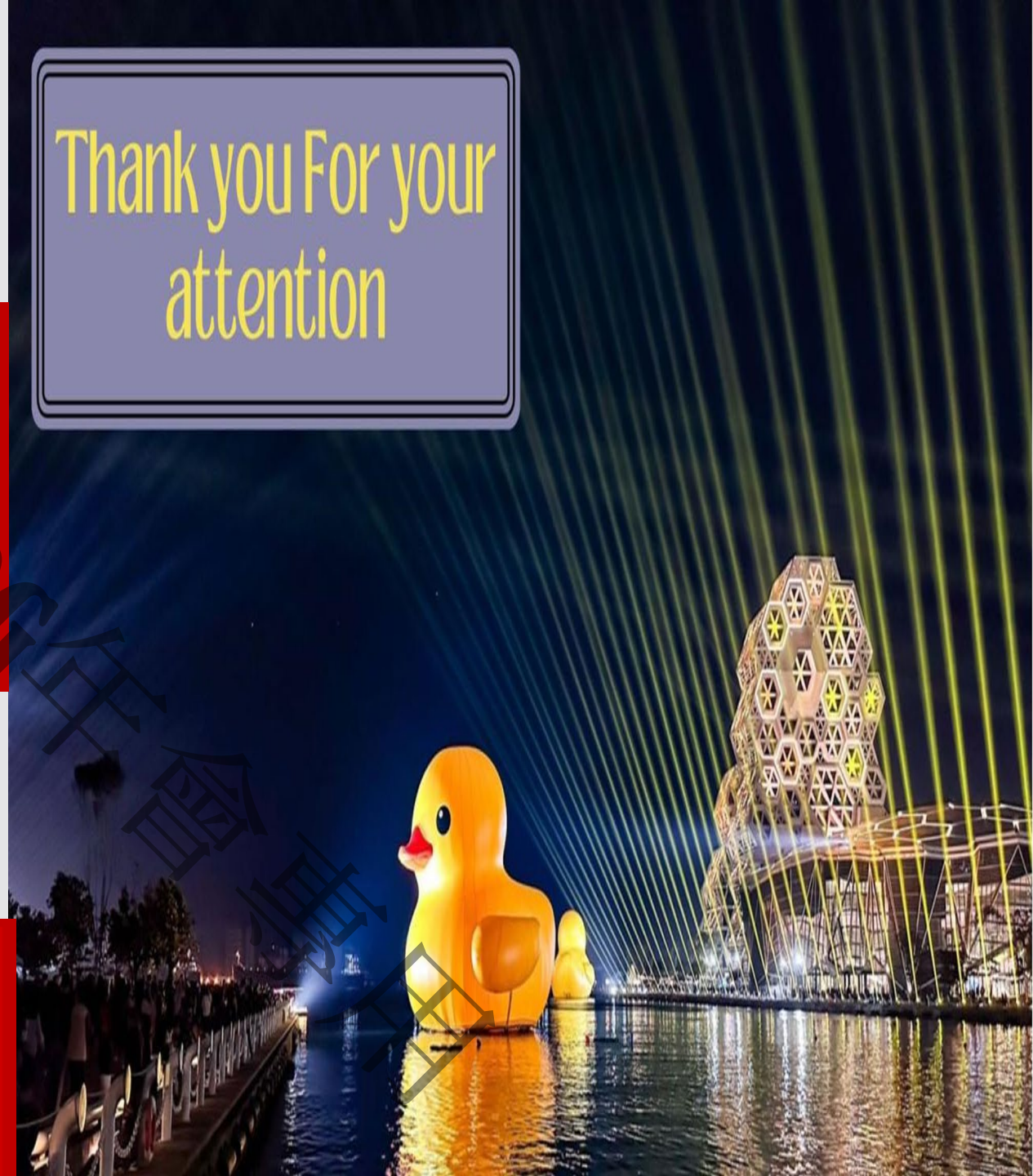
西藥不行，就改往去高雄 #漢丞中醫，去試試中藥。

結果，才吃中藥2週，這次生理期竟然沒痛，且也沒爆多的血量，真的是太神奇啦！

且我的發炎指數，也開始降【我停荷爾蒙藥1個月後，再去抽血】真的是太開心啦🤣🤣🤣

因阿姨的工作是營養師，她們診所是推廣自然醫學的理念。#相信身體是可以自行修復的

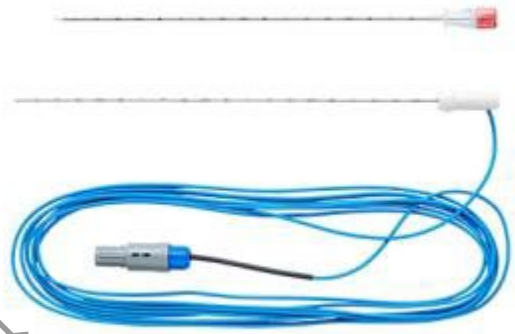
這一點跟漢丞中醫的林醫師理念一樣



RFA	MWA
Electric current	Electromagnetic energy
Grounding pads (risk of burns due to ground pads)	No grounding pads (no risk of burns)
Tissue charring and boiling cause increase of impedance that reduce electrical and thermal conductivity	Rapid and homogeneous heating + ionic polarization
Lower intratumoral temperatures	Higher intratumoral temperatures
More peri-procedural pain	Less peri-procedural pain
Unpredictable ablation zone	More predictable ablation zone
Heat-sink effect	Less susceptible to heat-sink effect
Single lesion can be treated	Simultaneous treatment of multiple lesions
More procedural time	Shorter procedural time
Less ablation volume	Larger ablation volume
Similar complications and complication rate	
Surgical clips or pacemaker are contraindications	Surgical clips or a pacemaker not a contraindication

EMPRINT™ ABLATION SYSTEM
WITH THERMOSPHERE™ TECHNOLOGY

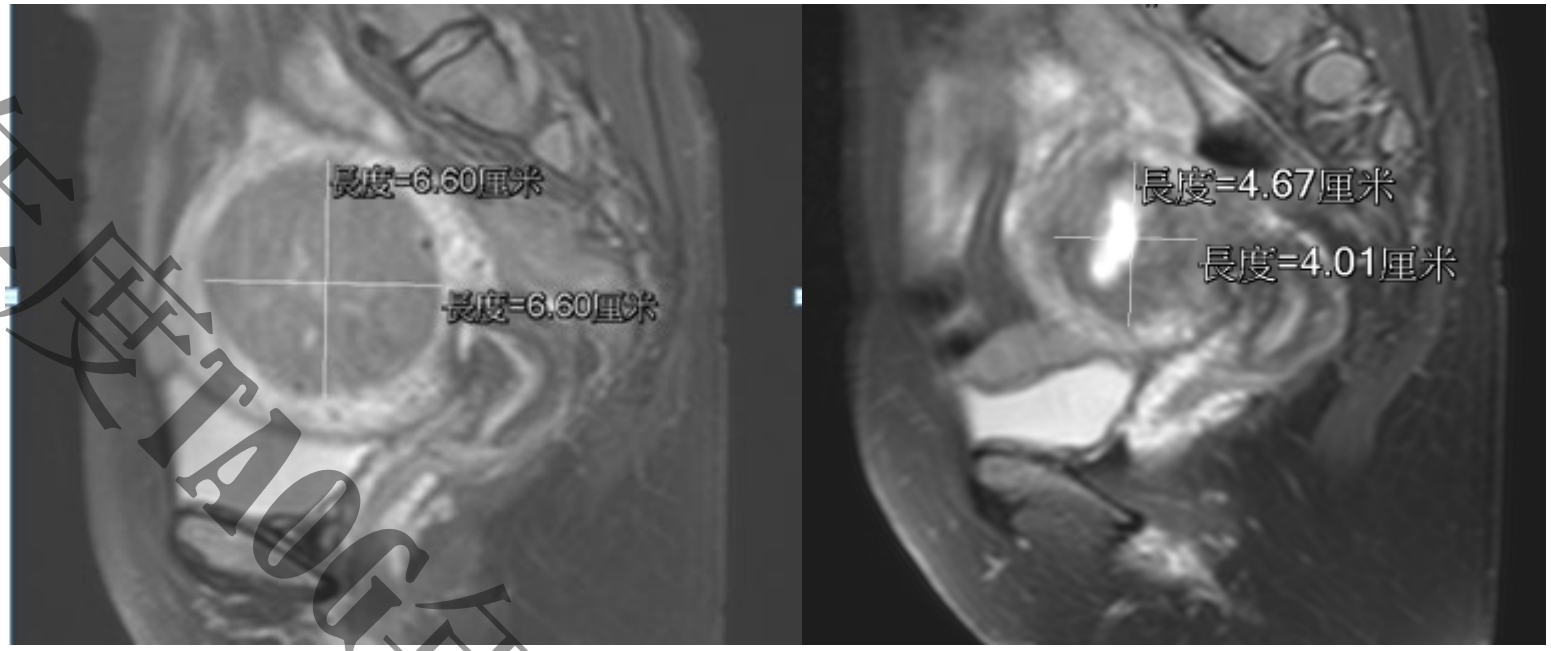
Microwave 30CM REIN PERCYTANEYS ANTENNA EMPRINT

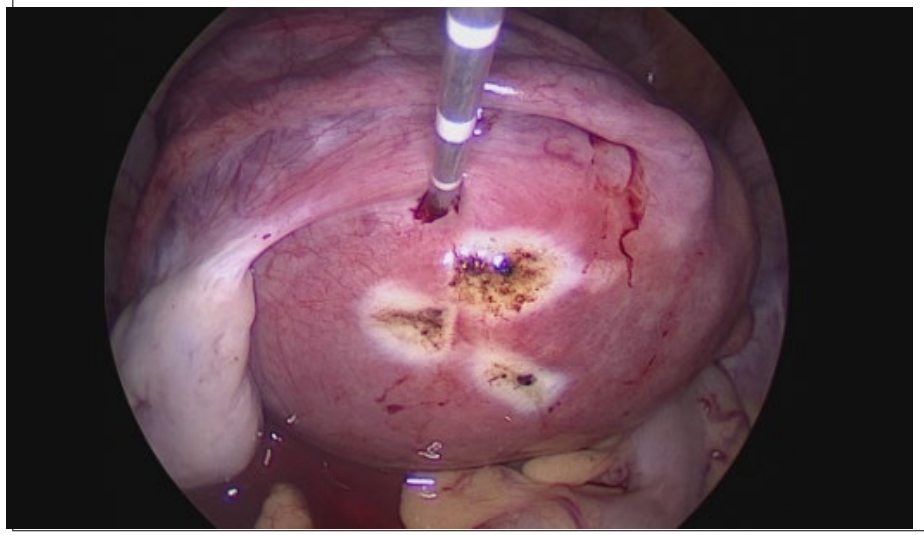


Temperature probe

Case 01

- 42y/o, G2P2A0
- urinary frequency, nocturia
- Uterine myoma at ant. wall

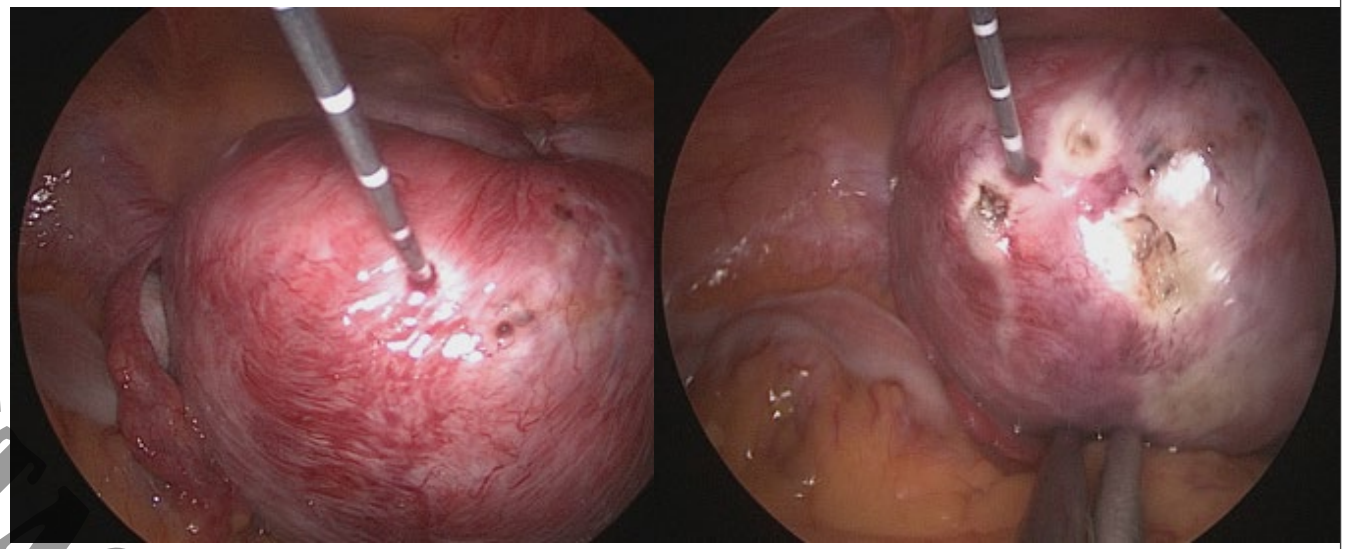


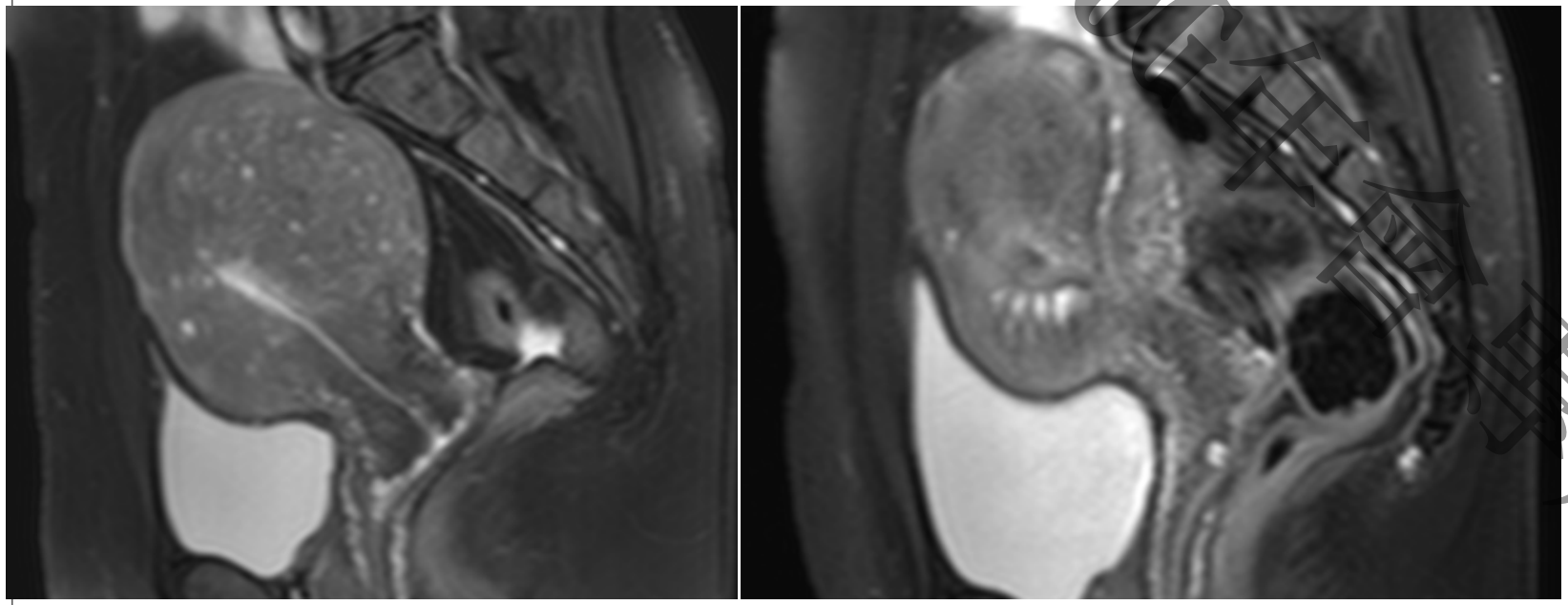


- 消融率 : 67%
- UFS-QOL : 36.8→25.7(6M)
- PBAC : 26→14
- VAS : 6→3

Case 02

- 42y/o, G3P2A1
- Adenomyosis post HIFU in 2018
- Dysmenorrhea and hypermenorrhea





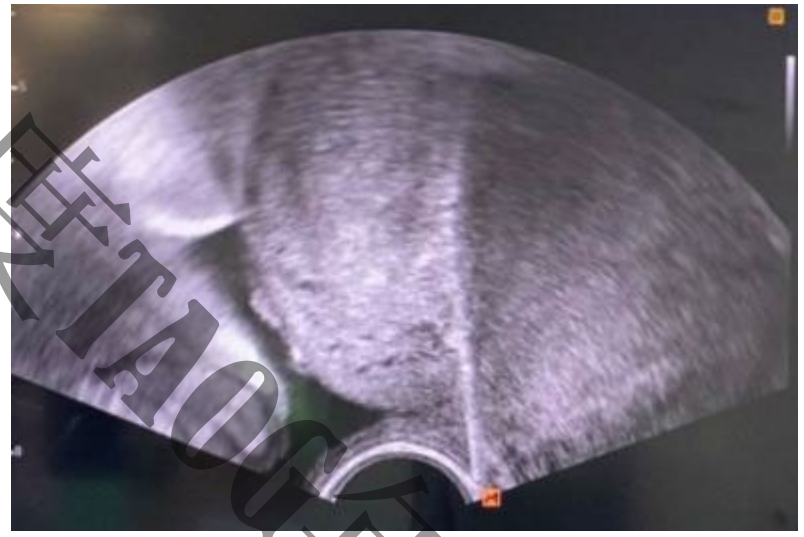
- 消融率 : 42%
- UFS-QOL : 33 → 0(3M)
- PBAC : 70 → 0
- VAS : 10 → 0

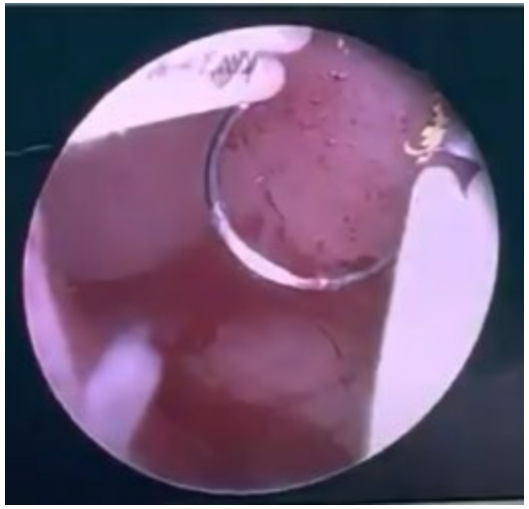
	HIFU	LSC-Microwave	Vagina-Microwave
Combined with subserosal myoma		V	
Concomitant Ovarian Tumor		V	
Predominant Dysmenorrhea adenomyosis	V	VVV	VV (post. ,>4cm)
EM Ablation	V	VV	VV
Myoma <4cm	V	V	V
*Having huge scar		V	V
*Cul de sac adhesion	V	V	

Case 1

- 34y/o, G2P2A0(C/S)
- Prolonged menstrual bleeding
- Adenomyosis at posterior wall

- Transvaginal lysis of adenomyosis + hysteroscopic exam on 2022/09/16





Ultrasound guided microwave ablation compared to uterine artery embolization treatment for uterine fibroids – a randomized controlled trial

Gudny Jonsdottir[a,b], Marie Beermann[b,c], Annika Lundgren Cronsioe[a], Klara Hasselrot[a,b] and Helena Kopp Kallner[a,b]

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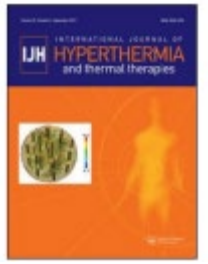


INTERNATIONAL JOURNAL OF HYPERTHERMIA, 2022, VOL. 39, NO. 1, 341–347

- ✓ A randomized controlled trial, premenopausal women 30–55 years, with symptomatic uterine fibroids **without any single fibroid exceeding mean diameter of 8 centimeters**, total 34 patients
- ✓ Volume, symptom severity score (SSS), health related quality of life (HR-QoL), amount of menstrual bleeding were evaluated at 6 months post treatment

Table 2. Primary and Secondary outcomes.

Outcome	MWA Baseline Median (IQR) Min–max	UAE Baseline Median (IQR) Min–max	MWA 6 months Median (IQR) Min–max	UAE 6 months Median (IQR) Min–max	*p* Value	Median of the difference	Confidence interval of the median of the difference Lower	Upper
Primary outcome								
Fibroid	96.1	116	56	42	0.29	0.15	−0.08	0.34
Volume	54–176.7	67.5–173.5	22–94	17–90				
(ml)	23–257	28–349	4–183	1–63				
Secondary outcomes								
SSS	65	72	28	25	0.882	3	−15.5	19.5
	50–75	58–78	21.5–41	9.5–44				
	16–100	37.5–100	0–56	0–75				
HR-QoL	64	50	93	88	0.882	−3	−25	21.7
	38–89	32–59	85–95.85	62.1–97				
	23–91	9–125	74–100	23–100				
PBAC	310	411	93	135	0.35	−95	−250	88
	152–482.5	233.5–606	67.5–127.5	37–283				
	68–1,606	127–1,565	29–368	4–555				
Period of hospitalization (days)			1	2	**<0.001**	–	–	–
			1–1	2-3				
			0–1	1–4				
Period of sick leave (days)			3	7	**0.001**	–	–	–
			2–6	5–13				
			0–14	4–28				

- ✓ Microwave ablation is a promising minimally invasive method for treating uterine fibroids.
- ✓ It carries **high tolerability** and **lower use of health care resources** compare to UAE.

A retrospective comparison of microwave ablation and high intensity focused ultrasound for treating symptomatic uterine fibroids

Wen-Peng Zhao [1], Zhi-Yu Han [2], Jing Zhang [3], Ping Liang *

Department of Interventional Ultrasound, Chinese PLA General Hospital, China

EUROPEAN JOURNAL OF RADIOLOGY 84 (2015) 413–417

- ✓ 31 patients underwent PMWA, 42 patients underwent USgHIFU
- ✓ A contrast-enhanced MRI was performed before and after treatment, and all patients were followed up for 6 months.
- ✓ Symptom severity scores (SSS), treatment time, ablation rate, fibroid regression rate and adverse events.

The comparison results between PMWA and USgHIFU in treating uterine fibroids.

Variable	PMWA	USgHIFU
Ablation rate (%)	79.8 ± 14.9% (70.9–99.1%)	77.1 ± 18.2% (60.2–97.4%)
Treatment time (min)	46.2* (35.4–60.7)	92.5* (54.3–121.6)
Regression rate at 6 months after treatment (%)	52.4% (43.1–68.7%)	50.3% (39.2–65.5%)
Changes in SSS at 6 months after treatment (score)	10.2 (5.4–16.7)	9.4 (4.8–14.9)
Incidences of adverse event (SIRC)	0	0

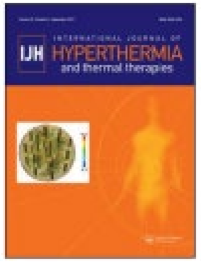
* $P = 0.006$.

- ✓ Both PMWA and USgHIFU are safe and effective modalities in the treatment of uterine fibroids.
- ✓ PMWA is ultimately more efficient than USgHIFU

Comparison between microwave ablation and radiofrequency ablation for treating symptomatic uterine adenomyosis

Xiao Liang Lin[a]*, Ning Hai[b]*#, Jing Zhang[a], Zhi Yu Han[a], Jie Yu[a], Fang Yi Liu[a], Xue Juan Dong[a] and Ping Liang[a]

[a]Department of Interventional Ultrasound, The First Medical Center, Chinese PLA General Hospital, Beijing, China; [b]Department of Ultrasound, Beijing Chaoyang Hospital, Capital Medical University, Beijing, China



INTERNATIONAL JOURNAL OF HYPERTHERMIA 2020, VOL. 37, NO. 1, 151–156

- ✓ 68 patients PMWA, 65 patients USgRFA
- ✓ Treatment time, percentage ablation, percentage uterine regression, symptom severity scores (SSSs), dysmenorrhea scores and adverse events
- ✓ All patients were followed up for 12 months

Table 2. Comparison of results between PMWA and USgRFA in treating adenomyosis.

Variable	MWA	RFA
Ablation (%)	79.7 ± 15.1% (72.5–99.3%)	79.2 ± 14.2% (70.5–99.1%)
Mean ablation time (minutes)*	16.3 ± 4.9 min (range, 5–23 min)	37.5 ± 6.2 min (range, 5–39 min)
Mean reduction of adenomyosis (%)		
3 months after treatment	54.4%	48.5%
12 months after treatment	71.7%	67.3%
Uterus volume reduction (%)		
3 months after treatment	44.8%	34%
12 months after treatment	64.9%	47.6%
Changes in VRS 12 months after treatment (score)	1.75 ± 1.13	1.92 ± 0.79
Changes in SSSs 12 months after treatment	17.4 ± 5.0	16.4 ± 4.8
Incidences of adverse event (SIRC)	0	0

*$p < 0.001$.

- ✓ The safety and effectiveness of PMWA and USgRFA in the treatment of uterine adenomyosis were similar
- ✓ The mean ablation time of PMWA was shorter than that of USgRFA.

Clinical Assessment from baseline before the intervention and 6 months post treatment

April 2015 – June 2019

75 patients suffered from symptomatic uterine fibroids

Objective Assessment

- MRI of Uterus
- Volume change of uterus and uterine fibroid lesion
- Lab Test:
  - Hemoglobin level
  - CA125
  - LDH

Subjective Assessment

- Overactive Bladder Symptom Score (OABSS)
- Urinary Distress Index (UDI-6)
- Incontinence Impact Questionnaire (IIQ-7)
- International Consultation on Incontinence Questionnaire - Short Form" (ICIQ-SF) Female
- Female Sexual Function Index (FSFI)

Symptomatic Improvement: Mean Scores at Baseline and 6 Months After Treatment

HIFU (n=75)

Variable scores	Pre- treatment	Post-treatment	P values*
OABSS	3.5 ± 3.1	2.6 ± 2.3	0.005**
UDI-6	16.1 ± 14.9	9.8 ±5.8	0.000**
IIQ-7	11.2 ± 10.5	5.0 ± 2.6	0.000**
ICIQ-SF	3.0 ± 4.6	1.9 ± 3.2	0.009**

* Paired t-test. ** Statistical significance

OABSS , Overactive Bladder Symptom Score ;UDI-6,Urinary Distress Index;IIQ-7, Incontinence Impact Questionnaire; ICIQ-SF; International Consultation on Incontinence Questionnaire - Short Form" (ICIQ-SF)

Table2. Changes in scores of Female Sexual Function Index (FSFI) before and after treatment of HIFU (n= 63)

	Pre-treatment	Post-treatment	P
FSFI	28.83± 30.82	37.25±35.26	0. 022**
Desire(1,2)	3.17± 1.42	3.67± 1.66	0. 003**
Arousal (3-6)	4.65± 5.59	6.30± 6.31	0. 012**
Lubrication(7-10)	6.06± 7.43	7.86± 7.98	0. 049**
Orgasm(11-13)	4.60± 5.62	5.79± 5.82	0. 039**
Satisfaction(14-16)	5.51± 5.98	6.22±6.22	0. 223
Pain(17-19)	4.92± 6.01	6.24± 6.31	0. 076

＊significant difference;
Data are given as median (range) or mean± standard deviation.
Paired Sample t test

Thanks for Your Coming !