

# Intrauterine balloon therapy: a novel ultrasound guided treatment for intrauterine adhesions

Sotirios H. Saravelos<sup>1</sup> · Tin-Chiu Li<sup>1</sup>

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**Abstract** The diagnosis of intrauterine adhesions is becoming more frequent owing to widely available and accurate diagnostic modalities. However, despite numerous publications on this topic, little has been reported in terms of novel treatment techniques in the past couple of decades. In the present article, two carefully documented cases are presented, in which a novel technique for the treatment of intrauterine adhesions has been applied. The first case concerns a woman with severe intrauterine adhesions managed as an inpatient under general anaesthesia. The second case concerns a woman with a single intrauterine adhesion band managed in the outpatient clinic setting. In both cases, ultrasound guided intrauterine balloon (IUB) therapy was performed to resolve the adhesions. This involved dilating the uterine cavity under ultrasound guidance via use of a balloon in order to bluntly divide the adhesion bands along the weakest possible planes. Both cases were followed-up with 2D/3D saline infusion sonography (SIS) in the subsequent cycle, which confirmed successful treatment and absence of adhesion reformation. Our preliminary experience suggests that ultrasound guided IUB therapy may be a valuable addition to the current methods used for the treatment of intrauterine adhesions and may well deserve further investigation within the context of a clinical trial.

**Keywords** Asherman's syndrome · Hysteroscopy, intrauterine adhesions · Saline infusion sonography

## Introduction

Despite intrauterine adhesions being documented for well over a century now, the treatment of this disease still poses a significant clinical challenge. It is also still associated with a very poor prognosis in the most severe of cases [1]. The traditional blind 'dilatation and curettage' employed several decades ago has now been widely replaced by treatment under direct vision with hysteroscopy. For severe cases, this is typically coupled with either laparoscopic or ultrasound guidance to reduce the risk of uterine perforation, although in refractory cases even performing open hysterotomy has been described [2].

Interestingly, despite the abundance of this disease, and the extensive literature accompanying it, there has been little change in the techniques regarding its treatment for some time now. Some novel methods described in the last couple of decades have included adhesion resection under fluoroscopic guidance [3–5], luminaria insertion [6] and intrauterine pressure lavage [7]. However, none of them seem to have been adopted and hysteroscopy alone remains the mainstay of treatment.

In this report, we wish to share our preliminary experience in performing ultrasound guided intrauterine balloon (IUB) dilatation therapy in order to treat intrauterine adhesions. We present two representative cases, the first performed for severe intrauterine adhesions in conjunction with hysteroscopy under general anaesthesia, and the second performed for mild intrauterine adhesions in the outpatient setting under ultrasound-guidance alone with simple analgesia.

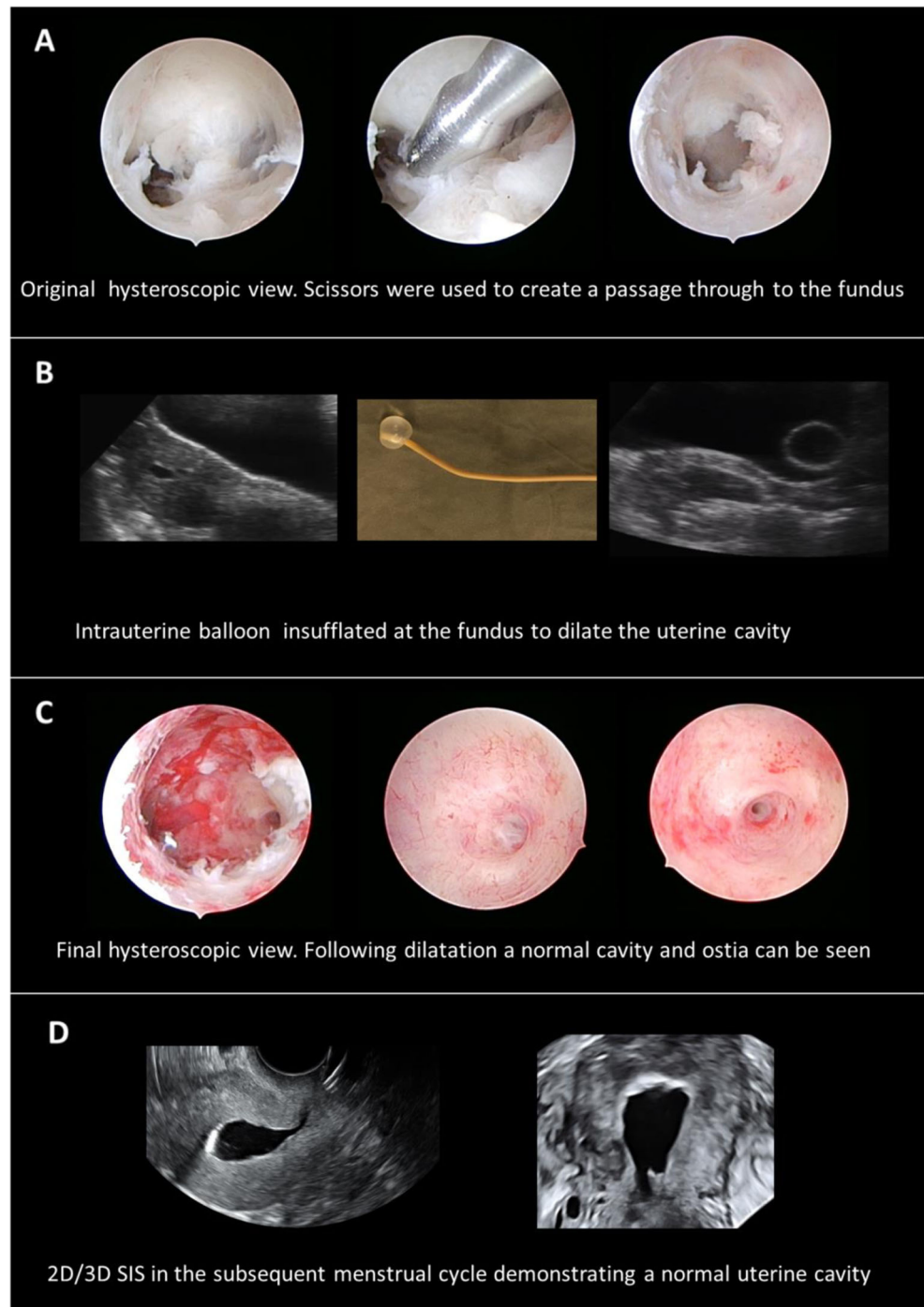
## Methods and findings

Both patients attended the Assisted Reproductive Technology unit, Chinese University of Hong Kong, and were treated at

✉ Tin-Chiu Li  
tinchiu.li@cuhk.edu.hk

<sup>1</sup> Assisted Reproductive Technology Unit, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong, Hong Kong

**Fig. 1** The steps involved in the treatment of severe intrauterine adhesions with the intrauterine balloon therapy technique in the inpatient setting (Case 1)



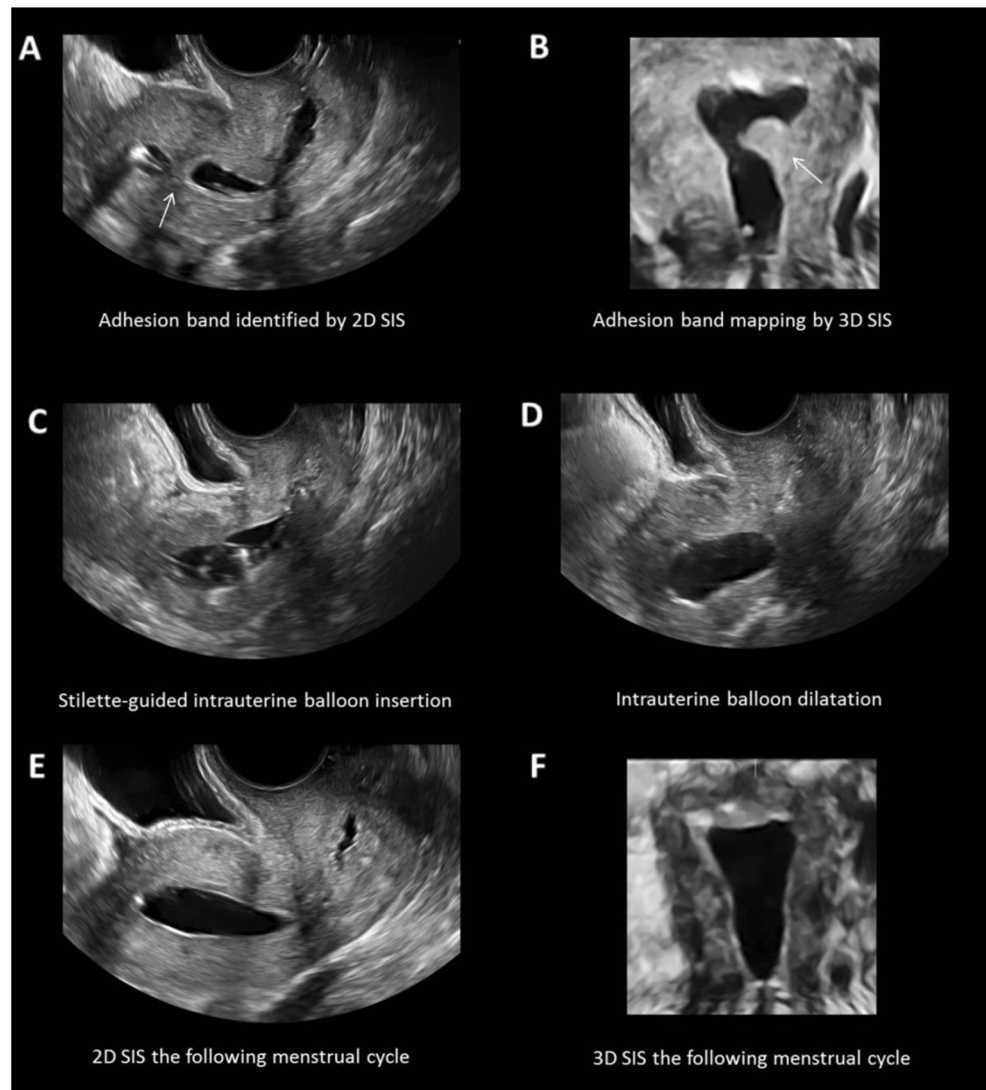
the Prince of Wales Hospital, Hong Kong. They provided written informed consent and the procedures were meticulously recorded for the purpose of publication and dissemination.

### Case 1

The first case was a 33 year old woman with secondary infertility due to both tubo-peritoneal and male factors. She had a history of a tubo-ovarian abscess with laparoscopic drainage

in 2001, with a subsequent hysterosalpingogram (HSG) indicating bilateral tubal blockage. Following a surgical evacuation for retained products of conception after her first ART cycle, she experienced significant oligomenorrhoea, despite having previously normal ovulatory cycles. Following a further ART cycle with cryopreservation of all embryos, she was arranged to have hysteroscopic surgery on the suspicion of Asherman's syndrome during ultrasound examination and mock embryo transfer.

**Fig. 2** The steps involved in the treatment of mild intrauterine adhesions with the intrauterine balloon therapy technique in the outpatient setting (Case 2)



Hysteroscopy was performed using an Olympus 4 mm rigid hysteroscope (Olympus Corporation, Tokyo, Japan) under abdominal ultrasound guidance with a Philips HD series ultrasound machine (Koninklijke Philips N. V, Amsterdam, Netherlands). The bladder was filled with saline through an 8fr Foley catheter to ensure adequate visualisation of the entire uterine outline on ultrasound. On entering through the cervical canal, the uterine cavity appeared almost entirely obliterated, with very small pockets of access, consistent with her symptom of significant oligomenorrhoea. Using semi-rigid scissors under continuous ultrasound guidance, a canal was created extending from the internal os all the way to the fundus, where a small pocket of fluid could be seen on ultrasound. At this stage, the cavity had a white-scarred appearance typical of uterine synechiae, with significant disease circumferentially and no access to the tubal ostia.

IUB dilatation was then attempted using a 14fr Foley catheter. This was prepared by cutting the catheter tip that

protruded beyond the balloon, and inserting a 6fr stilette (in this case an anaesthetic intubating guidewire) from its tip. This was important for two reasons; firstly, because the rigidity allowed the catheter to be manipulated through the adhesions and to the fundus without it bending, and secondly, because the echogenic stilette could be clearly seen on ultrasound allowing it to be positioned in the correct place prior to insufflation. Once the catheter had reached the fundus, approximately 5 mls of saline were used to insufflate the balloon in a pulsatile manner of increasing pressure increments. Under ultrasound guidance the balloon could be seen clearly distending the cavity by bluntly stretching and dissecting the intrauterine adhesions. The whole process required merely a few minutes. Once the cavity had been seen to successfully ‘stretch’ on ultrasound, the IUB was removed and diagnostic hysteroscopy was again performed to assess the cavity. On this occasion, the uterine dilatation resulted in the reappearance of a normal uterine cavity, and both ostia could be seen

clearly for the first time. There was obvious endometrial tissue with mild scattered oozing from the areas where the adhesions had been bluntly dissected. A Cooks intrauterine balloon stent (Cook Medical, Illinois, USA) was inserted at the end of the procedure for the postoperative period and the patient was prescribed antibiotic prophylaxis. No hormone replacement therapy was given and the patient experienced a normal menstrual period 4 weeks later. A follow-up 2D/3D SIS on week 5 revealed a smooth and homogenous early follicular phase endometrium of 5 mm, with a remarkably normal uterine cavity following saline flushing of a filmy residual adhesion. The steps of this procedure along with the ultrasonographic and hysteroscopic images both pre- and post-operatively are presented in Fig. 1.

## Case 2

The second case was a 38 year old woman with a history of 4 consecutive first trimester miscarriages, two of which were treated by surgical evacuation. Although initial investigations were normal, on 2D/3D ultrasound there was a suspicion of a left sided defect representing an adhesion band. In view of this, the patient was counselled regarding the option of concurrent diagnosis and treatment in the outpatient clinic setting, using SIS and the IUB dilatation technique, for which she agreed.

Assessment with SIS was performed in the outpatient clinic using a Voluson E8 Expert ultrasound machine (version BT13.5, GE Medical Systems, Zipf, Austria). For the catheter, a size 12fr Foley, with a 4fr embryo transfer obturator/stilette (Cook Medical, Illinois, USA) was used. Similarly to the first case, the catheter was firm enough enter through the cervix easily (i.e. without the use of a vulsellum) and could be easily manipulated within the uterine cavity. Two syringes were also prepared, one 50 ml syringe to infuse saline into the cavity for diagnostic purposes, and one 10 ml syringe to insufflate the Foley balloon for therapeutic purposes. On performing the transvaginal 2D/3D SIS a single mid-cavity adhesion band could clearly be seen arising from the left uterine wall. The catheter was carefully inserted under ultrasound guidance, so as to pass from the right side of the adhesion band and up to the fundus. It was then insufflated under the direction of the patient (i.e. until she felt increased pressure or discomfort) with a syringe containing no more than 10mls of saline. The balloon was initially filled with approximately 2 mls until the patient could feel the distention. A further 2-3mls were then infused in gentle pulsatile manner until the band could be seen to divide on US. This required a mere few seconds and the patient reported a short-lived feeling of discomfort, which resolved as soon as the adhesion had separated. After this short process, the balloon was deflated and a 2D/3D SIS was then performed to confirm resolution of the adhesion band. The patient tolerated the procedure very well with only simple analgesia (paracetamol 1 g orally), and was given a

single dose of prophylactic antibiotic (Azithromycin 1 g orally). She subsequently returned the following cycle having experienced a normal menstrual period, which lasted 24–48 h longer than the preceding ones. Ultrasound assessment showed a mid-follicular phase endometrium of 9 mm with a clear trilaminar pattern, while 2D/3D SIS demonstrated an entirely normal cavity outline. The outcome of the IUB therapy was easily conveyed to the patient at the bedside through the self-explanatory ultrasound images. The steps of the procedure along with the pre- and post-procedural ultrasound images are shown in Fig. 2.

## Conclusions

In conclusion, we present a novel approach for the treatment of intrauterine adhesions, involving ultrasound guided IUB dilatation. According to the severity of the adhesions, this can be applied either alone or in conjunction with hysteroscopy. The IUB therapy relies on the simple principle of mechanical blunt dissection of the adhesions along the weakest tissue planes, and may prove to be a valuable addition to the current treatment methods available. Owing to its simplicity, low cost and wide availability, this novel approach may well deserve further investigation within the context of a clinical trial. In particular, important endpoints such as correlation with the traditional hysteroscopic approach, risk of adhesion reformation and clinical outcomes ought to be examined.

**Authors' contributions.** SH Saravelos and TC Li both contributed to the concept of this treatment approach and the writing of this manuscript

## Compliance with ethical standards

**Conflict of interest** The authors have no relevant funding or conflicts of interest to disclose.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in this report.

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