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## Ovaries do not float

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**Abstract** Hydrofloatation anti-adhesion solutions are often used to try to prevent adhesion formation around the ovary following surgery for endometriosis. Adhesions between the ovary and the ovarian fossa are very common following this surgery, and to be effective in preventing these, the hydrofloatation solution should separate the ovaries from the side wall. We demonstrate that ovaries do not float in either Hartmann's solution, normal saline or 4% icodextrin. It is unlikely therefore that any of these solutions would be effective in preventing sub-ovarian adhesions.

**Keywords** Endometriosis · Hydrofloatation solution · Ovarian adhesions

### Introduction

The burden of adhesions following gynaecological surgery is now well established, occurring after 60–90% of gynaecological procedures [1] and being in some way implicated in readmission rates of 64/100 primary procedures over a 10-year period [2, 3]. Operations on the ovaries appear to be particularly prone to cause need for readmission, with this figure rising to 106.4/100 following ovarian surgery [3]. Unfortunately, despite previously held belief that laparoscopic surgery reduces adhesion formation, the SCAR-2 study has shown no difference in adhesion-related readmission rates between open and laparoscopic surgery, although it is difficult to provide direct comparisons due to lack of specific coding in the laparoscopy group [4]. With such knowledge all gynaecologists have a duty of care to take whatever action possible to minimise adhesion formation. This includes

good surgical practice and the consideration of anti-adhesion adjuvants [5].

Endometriosis is a very common gynaecological condition, with the ovaries being the most frequent site of disease [6]. Deposits are often found on the underside of the ovary, causing the ovary to become adherent to the ovarian fossa. Surgical treatment involves releasing the ovary from its fossa by a combination of sharp and blunt dissection and either ablation or excision of the disease. At the end of the procedure, therefore, there are two opposing raw surfaces, which are very prone to re-adhere. As such, it is common practice to use some form of adhesion preventative agent to try and avoid this.

Adhesion prevention agents broadly fall into two categories: site specific and non-site specific. The latter rely on hydrofloatation of the viscera postoperatively to allow healing to occur with the viscera separated and therefore, theoretically, decreasing the chance of adhesion formation. Clearly, to be effective, however, the viscera have to float. Whilst this is obviously likely in an air-containing viscera such as the bowel, the same cannot be assumed of other organs. The most commonly used solutions for hydrofloatation are either Hartmann's solution, normal saline (sometimes heparinised) or 4% icodextrin solution. We therefore conducted a simple experiment to see if ovaries floated in these solutions.

### Materials and methods

Following three laparoscopic hysterectomies with bilateral salpingoophorectomy, both ovaries were detached from the specimen and placed in 500 ml of Hartmann's solution followed by 500 ml of normal saline and finally 500 ml 4% icodextrin to see if they floated.

### Results

In all cases, the ovaries sank to the bottom of the solution (Fig. 1).

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**Fig. 1** Ovaries in 500 ml of 4% icodextrin

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### Conclusion

Ovaries do not float in any of the commonly used solutions for hydrofloatation. It is thus unlikely such solutions

would be effective in preventing ovaries from becoming re-adherent to their fossae following treatment of ovarian endometriosis.

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