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## CLINICAL ARTICLE

## A new surgical technique of hymenoplasty

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## ABSTRACT

**Objective:** To review data from patients who have undergone hymenoplasty with a novel surgical technique, termed the STSI (suture three stratums around the introitus) method. **Methods:** In a retrospective study, data were reviewed from patients who underwent hymenoplasty by STSI at a center in Beijing, China, between January 2010 and January 2014. Patients were scheduled to attend a follow-up appointment 1 month after surgery. Long-term follow-up was conducted by telephone. Follow-up data and preoperative and postoperative photos were assessed. **Results:** Overall, 125 patients had undergone hymenoplasty using the STSI method. Only 1 (0.8%) patient had an early postoperative complication (uncontrolled bleeding). Among the 99 patients who returned for follow-up at 1 month, healing was recorded for 91 (91.9%). Long-term follow-up suggested that no patient had persistent dyspareunia, menstruation changes, or other health problems after the surgery. Among 51 patients who reported sexual intercourse since the surgery, 47 (92.2%) were satisfied with the outcome and 28 (54.9%) reported blood loss during the first intercourse. **Conclusion:** The STSI method seems to be an effective, enduring, and safe technique of hymenoplasty.

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## 1. Introduction

The hymen is a thin, bloodless, elastic mucosa surrounding the opening of the vaginal introitus [1]. The most common configuration is the annular hymen [2,3]. The hymen is often deemed to be intact if the diameter of the hymenal opening is approximately 1 cm or smaller [4,5]. Penetrating hymenal trauma (e.g. sexual intercourse, vaginal tampon use, and surgical procedures [6]) will result in deep clefts in the hymen and destroy its integrity [7]. Studies show that only 50%–60% of women have blood loss when the hymen ruptures at first coitus, presumably owing to the lack of blood supply [3,8].

Virginity before marriage is traditionally associated with the integrity of the hymen and blood loss [3,8,9]. In many regions of the world, a woman can be forced to undergo a vaginal examination by a gynecologist to get “official certification” if there is suspicion that she might not be a virgin [8]. Furthermore, a woman who does not show an intact hymen or fails to stain the nuptial bed can be accused of as bringing shame to her family [8,10]; consequences include violence, divorce, and even death [11–14].

Although ethically and culturally controversial, hymenoplasty is a legal practice in gynecology or plastic surgery in many countries [15–17].

A growing number of women are requesting hymen reconstruction in Canada and the USA [3,10,15]. Nevertheless, one study [18] found that only 12% of doctors considered that they had sufficient knowledge for this task, and another [10] found that more than half of doctors have a strong need for further information and education on hymenoplasty. However, published studies investigating hymenoplasty are scarce [17], and only two surgical techniques of hymenoplasty have been reported: the approximation method and the cerclage method [5,7,15].

The Plastic Surgery Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China, has 10 years of experience of hymenoplasty, during which it has been noted that patients fall into two categories. Patients in the first group are those who seek a hymenoplasty only days before a planned marriage and have no expectation for real wound healing. Instead, their emphasis is on the symbolic function of the hymen—namely, tightness or blood loss. These patients are referred to receive a “transient” hymenoplasty.

Patients in the second category are frustrated owing to a loss of “virginity” (e.g. after rape or surgical intervention) and want to restore self-confidence via hymenoplasty. Their marriage date is usually unknown and can even be years later. There are many more patients in this category than in the first, and they require real wound healing of the hymen. Because their focus is on restoration of an intact hymen, they are referred for an “enduring” hymenoplasty. The approximation method—in which the epithelial layer that has grown over the ruptured hymen is removed and the hymenal remnants are adapted by left-to-right approximation [15]—might seem to be a good option for these patients. However, wound dehiscence frequently occurs in the approximation method.

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In 2008, it was noticed that patients at the study center who simultaneously received both hymenoplasty and perineoplasty (also known as “vagina contraction”) had a higher rate of wound healing. On the basis of this finding and the principle of perineoplasty [19–21], a novel technique of hymenoplasty was developed to increase the healing rate: the STSI (suturing three stratum around the introitus) method. The aim of the present study was to retrospectively review data from patients who have undergone hymenoplasty by the STSI method.

## 2. Materials and methods

In a retrospective study, data were reviewed from patients who underwent hymenoplasty by the STSI method at the Plastic Surgery Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China, between January 1, 2010, and January 31, 2014. The principles outlined in the Declaration of Helsinki were followed for the study. All patients provided informed consent for inclusion in any future analyses.

Due to the ethical controversy surrounding hymenoplasty, the operation is performed only when a patient requests the surgical procedure.

Before each operation, the patient was informed that, even if she regained an intact hymen, the possibility of bleeding during the first intercourse was approximately 50% [3,8].

All operations were performed in the outpatient clinic with patients in the lithotomy position. On the basis of the location of the clefts, the patient underwent either type 1 STSI (Fig. 1) or type 2 STSI (Fig. 2). Type 1 is used when the cleft(s) are located in any site from 4 o'clock to 8 o'clock. Type 2 is used when the clefts are located at 3 o'clock and/or 9 o'clock.

In both STSI methods, the three stratum are sutured as follows. In the first stratum (Figs. 1E, 2E, and F), the hymenal mucosa near to the vagina (the inner mucosa of the hymen) is sutured. In the second stratum (Figs. 1F and 2I), the fascia layer under the hymenal mucosa is sutured (Fig. 3); the surgeon should fix more tissues and ligate firm knots because this layer bears the most tension of the three stratum. In the third stratum (Figs. 1G, 2G, H, and J), the mucosa near to the vaginal orifice (vulva vestibule), including the outer mucosa of the hymen and the mucosa of vulva vestibule, is sutured. Last, the suture is run through all three stratum with a knot to avoid dead space (Figs. 1G and 2J).

All patients were discharged on the day of surgery and were reminded that they should not engage in any activities that are associated with a straddle position (e.g. riding a bike) or that increase abdominal pressure (e.g. constipation) for 2 months to guarantee wound healing. All patients were asked to return to the hospital for follow-up after at least 1 month (because the suture used was supposed to be absorbed in this time). Incision healing was assessed by the following standard: an annular hymen with a hymenal orifice smaller than or approximately 1 cm [3–5].

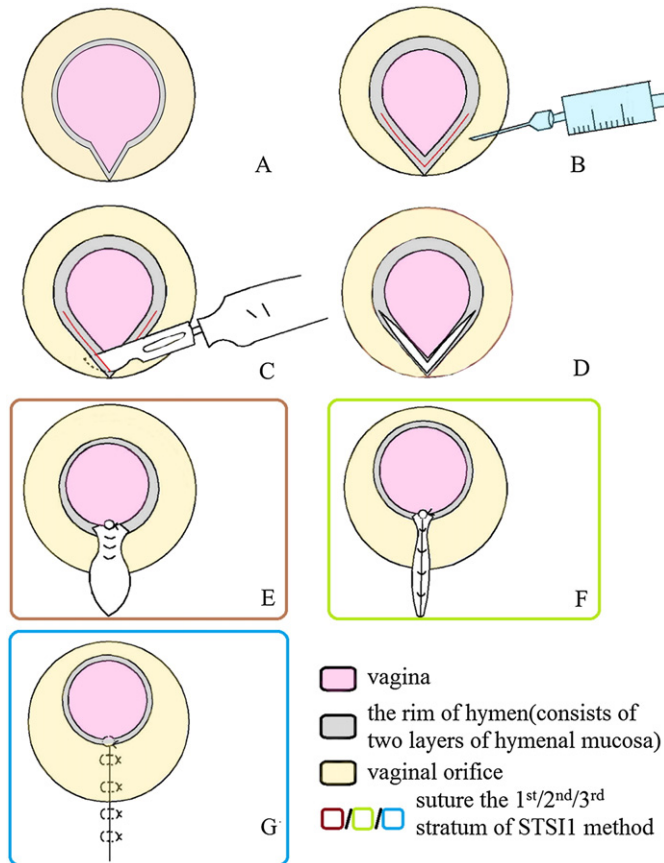
For the present study, the names, ages, telephone numbers, and pre-operative and postoperative images of all patients were documented. Long-term follow-up had been done by telephone four times in the study period, in each case over a period of 7 days: from December 27, 2010, to January 2, 2011; from December 26, 2011, to January 1, 2012; from December 31, 2012, to January 6, 2013; and from April 21 to April 27, 2014. During these periods, follow-up was attempted with all patients who had undergone the procedure at the study center. The results of the four follow-ups were grouped together to gain the final result.

A simple questionnaire was used during the follow-up phone calls, which had been designed to evaluate the safety and effectiveness of the STSI method in the long-term. To protect patient confidentiality, each patient was told that she simply needed to answer “yes” or “no.” The results are reported qualitatively and by simple numbers and percentages.

## 3. Results

In total, 125 patients underwent the STSI method of hymenoplasty (59 type 1; 66 type 2). The mean age of the patients was 28.5 years (range 20–40). The mean duration of surgery was 28 minutes (range 24–35) for type 1 and 38 minutes (range 33–44) for type 2. Only 1 (0.8%) of the 125 patients had an early postoperative complication: this patient returned to the hospital the day after the operation owing to uncontrolled bleeding, and the gap was successfully sutured to achieve hemostasis. Although the patient was informed that the hymen was no longer intact, she did not request a further procedure.

Among the 124 patients without early postoperative complications, 99 (79.8%) returned for the 1-month follow-up appointment. At this point, healing was recorded in 91 (91.9%) women (85 had completely healed incision; six had superficial clefts but the diameter of the orifice was approximately 1 cm or smaller). Preoperative and postoperative images for a typical case are shown in Fig. 4. Major dehiscence of the wound was observed in the remaining 8 (8.1%) patients, four of whom reported that they had not complied with the doctor's advice. Two of these four patients requested secondary reconstruction and



**Fig. 1.** The type 1 STSI method of hymenoplasty. (A) Identification of the location of the cleft. (B) Patient prepared for resection with local anesthesia; the incision line (two-fifths to one-half of a circle) is designed. (C,D) Resection: the rim of the hymen is removed according to the designed line and resection is continued to a depth of 0.5–1.0 cm in the direction of the vagina to expose the fascia layer under the hymenal mucosa (C); inner and outer mucosa of the hymen separated, and the fascia layer exposed (D). (E) Suture of the first stratum: the hymenal mucosa near the vagina is sutured by interrupted horizontal mattress suture, after which the hymenal opening is reduced by two-fifths to one-half, and then thorough hemostasis is performed. (F) Suture of the second stratum with a simple interrupted suture. (G) Suture of the third stratum: the hymenal mucosa near the vulva vestibule is sutured by interrupted vertical mattress suture. White areas show wound areas after resection and residual wound areas after suturing.

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