Correction of Inverted Nipple Using Trans-Nipple Z-Plasty

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Purpose: Numerous conservative and surgical methods have been reported for correction of inverted nipples. We herein report a technique using Z-plasty for correction of inverted nipples. This technique is sufficient for release of fibrotic tissue bands and maintenance of the nipple's proper shape and function. **Methods:** A total of 22 patients with 28 inverted nipples underwent correction with trans-nipple Z-plasty from 2010 to 2013. The mean age was 46.7 ± 11.2 years, and six patients had bilateral inverted nipples. A midline incision and 5 mm double Z-incisions were made on the nipple-areola complex for trans-nipple Z-plasty. The contracted tissues were separated from the lactiferous ducts, and the underlying tight fibrous tissue bands were removed. The split nipple and areola were then closed with absorbable monofilament sutures using the Z-plasty technique. **Results:** One case of partial nipple necrosis occurred and improved with conservative treatment. No complications or recurrence occurred during a mean follow-up period of 34.0 ± 7.7 months. **Conclusion:** Trans-nipple Z-plasty is a simple and useful surgical procedure for severely inverted nipples.

Key Words: Abnormality, Nipples, Plastic surgery

INTRODUCTION

An inverted nipple, in most cases, is a congenital condition or develops secondary to mastitis or malignancy [1]. Although the incidence rate of inverted nipples is relatively low at 10%, and these are not life-threatening, severely inverted nipples cause functional and cosmetic problems [2,3]. Numerous surgical techniques have been introduced to correct inverted nipples [4-8].

The grading of inverted nipple is based on the level of effort required to manually pull the nipple out, duration of nipple protrusion after manipulation, and amount of fibrosis located radially around the nipple [9]. It is difficult to manually pull a grade III inverted nipple out, and this type has higher incidence of recurrence when conservative treatments such as manual procedures or purse-string suturing are performed.

We herein describe the method and long-term results of a trans-nipple Z-plasty technique for correction of severely inverted nipples without major injury to the lactiferous ducts.

METHODS

From 2010 to 2012, trans-nipple Z-plasty was performed to correct 28 inverted nipples in 22 patients. The mean age of the patients was 46.7 ± 11.2 years, and six patients had bilateral inverted nipples. The causes of the inverted nipples were congenital defects ($n=24$), abscesses ($n=3$), and a fistula ($n=1$). Every inverted nipple was graded based on Han and Hong's classification system [9]. This study was a single group observational study, which included grade I-III inverted nipple cases and excluded those in which the inverted nipple condition was associated with malignancy. Postoperative complications and recurrence were evaluated during the follow-up period.

Informed consent was obtained from all patients and the protocol used in this study was approved by the Institutional Review Board Committee of the Pusan National University Hospital (E-2015024).

Surgical technique

The surgery was performed under local anesthesia using a < 20 mL

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injection of 1% lidocaine. Before the surgery, the design of the trans-nipple Z-plasty was drawn on the lateral side of the breast (Figure 1). A midline incision and 5 mm double Z-incisions were made with a no. 10 blade on the nipple–areola complex, extending toward the depressed wrinkle of the inverted nipple. Countertraction of the split nipple was achieved with mosquito forceps, and the underlying tight fibrous tissue bands were transected and removed until sufficient pro-

pulsion of the nipple was achieved. Each side of a triangular flap was transposed with the Z-plasty to fill the dead space. The nipples were split and areolar incisions were closed with 4–0 monofilament sutures (Monosyn; Aesculap Inc., Center Valley, USA) as performed during a routine Z-plasty (Figure 2). Postoperatively, 4×4 gauze squares were cut into doughnut shapes and stacked as high as the nipple to protect the nipple from compression.

Figure 1. Schematic sketches of trans-nipple Z-plasty. (A) Diagonal lines (AC and BD, A'C' and B'D') are drawn at a 60-degree angle from the middle line of the nipple. The length of the lateral limbs of the Z-plasty must be precisely equal to the central incision. (B) The tips E and E' are pulled toward the tips D and D', and the tips F and F' are pulled toward the tips C and C'. The triangle-shaped flaps are then transposed their appropriate locations.

Figure 2. Stepwise introduction of trans-nipple Z-plasty for inverted nipple. (A) The incision lines of the Z-plasty are drawn on the nipple–areolar complex. (B) The nipple is split and diverged from the center. The tight fibrous tissue band (arrow) is dissected and removed. (C) One side of the triangular flap is transposed with the Z-plasty. (D) The other side of the triangular flap is transposed in the same way. (E) After both sides of the Z-plasty have been completed, the protruded nipple is closed from the base to the top with layer-by-layer sutures. (F) Completion of the surgical correction of inverted nipple.

Figure 3. Application of trans-nipple Z-plasty to correction of inverted nipples. (A, C) Preoperative views of inverted nipple. (B, D) Postoperative views of inverted nipple correction using trans-nipple Z-plasty. Operative scars are not visible, and the nipple protrusion is well maintained.

RESULTS

The degree of nipple inversion was classified as grade I ($n = 4$), grade II ($n = 11$), and grade III ($n = 13$). The mean operative time was 32.6 ± 12.4 minutes. All patients were discharged on the day of surgery. Only one case of partial necrosis of the nipple occurred and improved with conservative treatment. No evidence of recurrence was observed during the follow-up period of 34.0 ± 7.7 months (Table 1). Two cases including the preoperative and postoperative photographs are shown in Figure 3.

DISCUSSION

Inverted nipples are defined as nipples that lie on the same or a lower plane than the areola. The incidence rate of inverted nipples is about

Table 1. Clinical characteristics of patients with inverted nipples corrected by trans-nipple Z-plasty

Characteristic	No. (%) ($n = 28$)
Age (yr)*	46.7 ± 11.2
Bilateral nipple inversion	6 (21.4)
Cause of nipple inversion	
Congenital	24 (85.7)
Abscess	3 (10.7)
Fistula	1 (3.6)
Grade of nipple inversion	
Grade I	4 (14.3)
Grade II	11 (39.3)
Grade III	13 (46.4)
Operative time (min)*	32.6 ± 12.4
Postoperative complications	1 (3.6)
Follow-up duration (mo)*	34 ± 7.7

*Mean $\pm$ SD.

2% to 10% [2,10]. Although most cases of nipple inversion are congenital, acquired nipple inversion can be caused by inflammation, infection, surgery, trauma, or malignancy [11].

Inverted nipples are generally graded using the Han and Hong's classification system, which categorizes nipple inversion into three grades [9]. In grade I, the inverted nipple can be easily pulled out manually and maintains its projection well without further traction. Gentle finger pressure around the areola causes the nipple to pop back out. In grade II, the inverted nipple can be pulled out, but not as easily as in grade I. Because grade II inverted nipples have a moderate degree of fibrosis, both the nipple and lactiferous ducts tend to be retracted. However, release of the fibrosis by cutting is unnecessary. In grade III, the nipple is severely retracted and inverted. It is difficult to manually pull the nipple out, and physical force is required to hold it out. There is significant fibrosis beneath the nipple, and it is impossible to obtain optimal release of the fibrotic band while preserving the ducts [2,11].

Numerous surgical and conservative techniques have been introduced for correction of inverted nipples [12-14]. The treatment method should be individualized based on the characteristics and grade. For example, severely inverted nipples cannot be corrected with a conservative method alone; such cases require surgery. Proper treatment for inverted nipples should have a low recurrence rate, minimal postoperative scarring, and no major injury to the lactiferous ducts.

The dermofibrous flap, which is a popular method for correction of inverted nipples, is very simple and easy to use [5]. However, this technique is associated with a high recurrence rate because creation of an accurate tunnel beneath the nipple is difficult. We introduced a trans-nipple Z-plasty technique for removal of benign periareolar disease in patients with inverted nipples. Because the Z-plasty involves creation of a large incision and is associated with the risk of duct injury, it was difficult to apply as the sole correctional technique for inverted nipples without any mass or abscess. In our experience, however, surgeons with meticulous skills can also apply this technique to correction of simple inverted nipples. Nipple protrusion was maintained for >4 years postoperatively.

Because several lactiferous ducts and fibrotic tissues are resected during trans-nipple Z-plasty, young patients planning to have children may lose their ability to breast feed. Thus, this surgical procedure is more appropriate for patients who are not planning to have children. Another disadvantage of this procedure is the development of a

long scar inside the areolar circle. During the follow-up period, however, we found that the scar became faint and disappeared.

Although this was an observational study with a modified surgical technique, the cosmetic and long-term follow-up results were acceptable. Thus, the trans-nipple Z-plasty could be a feasible and useful technique for correction of inverted nipples without major complications. However, further evaluation and comparison with a control group would be necessary to accurately demonstrate the usefulness of the surgical technique.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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