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A Method for Correcting an Inverted Nipple with an Artificial Dermis

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Abstract. Various methods have been reported to correct an inverted nipple. Although a satisfactory outcome has been reported with most techniques, each method carries a drawback inherent in the technique itself, including complicated operative technique, sensory disturbance of the nipple, marked scarring of the nipple areola and other donor regions, destruction of breast function, and incomplete correction.This report describes a simple method for correcting an inverted nipple. It incorporates a new concept of using artificial dermis for tissue augmentation and is performed without sacrificing any donor site and complex design. It was applied to four nipples in two nulliparous cases. For all four corrected inverted nipples, good results were obtained, and there have been no complications. There were no deformities of the nipples or the areolas after this procedure, and the surgical scars were inconspicuous.

Key words: Artificial dermis—Inverted nipple—Surgical method

Various methods have been reported for correcting this condition. Although a satisfactory outcome has been reported with most techniques, each method carries a drawback inherent in the technique itself, including complicated operative technique [1–8,10–21], sensory disturbance of the nipple, marked scarring of the nipple areola and other donor regions, destruction of breast function, and incomplete correction. Yannas and Burke [22,23] reported a bilayer artificial dermis made up of a collagen sponge, and this has been used for various clinical cases. We devised a simple method for correcting inverted nipples that uses the advantages of an artificial dermis without a complicated design comprising a flap and a graft.

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Methods and Materials

The reported method was applied to four nipples in two nulliparous cases. One patient was 23 years old, and the other was 19 years old. They had no history of infection, inflammation, trauma, tumor, or breast surgery. They had no effects despite nonsurgical correction of their inverted nipples such as the Hoffman procedure. The nipples could barely be pulled out manually. We received informed consent from both subjects before starting this new procedure.

Our method was implemented as follows. Surgery was performed with the patient under local anesthesia. Two incision lines measuring about 1.5 cm were planned at the 3 and 9 o'clock positions along the edge of the areola (Fig. 1). Skin incisions were made on both sides of the areola edge. This allowed easy identification and dissection of the ducts. With the application of a traction suture to the nipple, a subcutaneous tunnel was made by repeated sharp splitting and stretching maneuvers with scissors. Careful dissection was required to preserve the lactiferous ducts during this procedure.

Once the contracted fibrotic tissue was separated from the lactiferous ducts, the ducts were extended

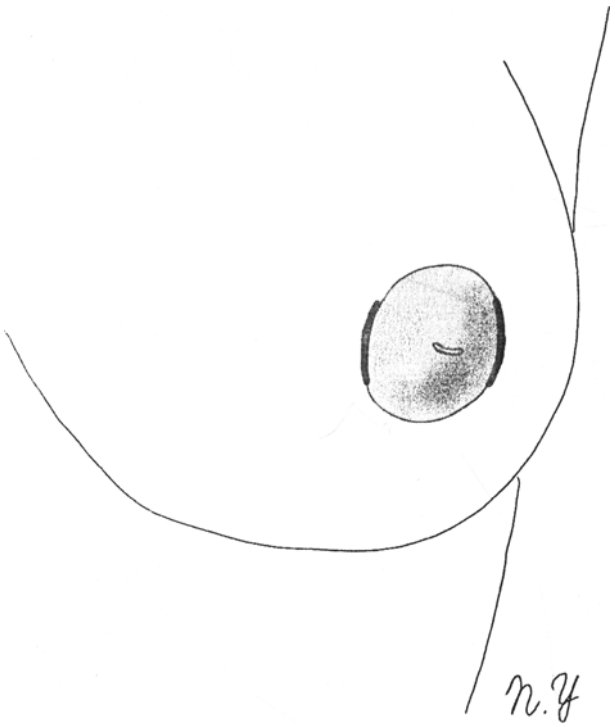

Fig. 1. Two incision lines (1.5 cm) designed at the 3 and 9 o'clock positions along the edge of the areola.

until the nipple was free and capable of complete eversion (Fig. 2). Separation and extension should be performed completely, even if a few lactiferous ducts are torn during the procedure, because the preservation of restricted ducts may prevent the normal functioning of the nipple [15]. At this stage, the nipple was held in a completely projected position without traction. The blood and nerve supply to the nipple–areola complex was preserved superiorly and inferiorly in the bipedicle skin–dermal flap, and vertically in the subcutaneous pedicle along the lactiferous ducts.

The artficial dermis (TERUDERMIS; TERUMO, Tokyo, Japan) was reshaped to fit the soft tissue deficiency (Fig. 3, left), inserted through the subcutaneous tunnel, and secured to the lactiferous ducts, filling the soft tissue deficiency and retracting the nipple to the reduced position (Fig. 3, right). Finally, the incision wounds were closed in two layers, completion of the operation required less than 30 min. The newly everted nipple was retracted and fixed for 4 weeks. The traction suture was tied to a toothpick placed on top of the sponge with a hole cut centrally. This allowed direct inspection of the nipple (Fig. 4).

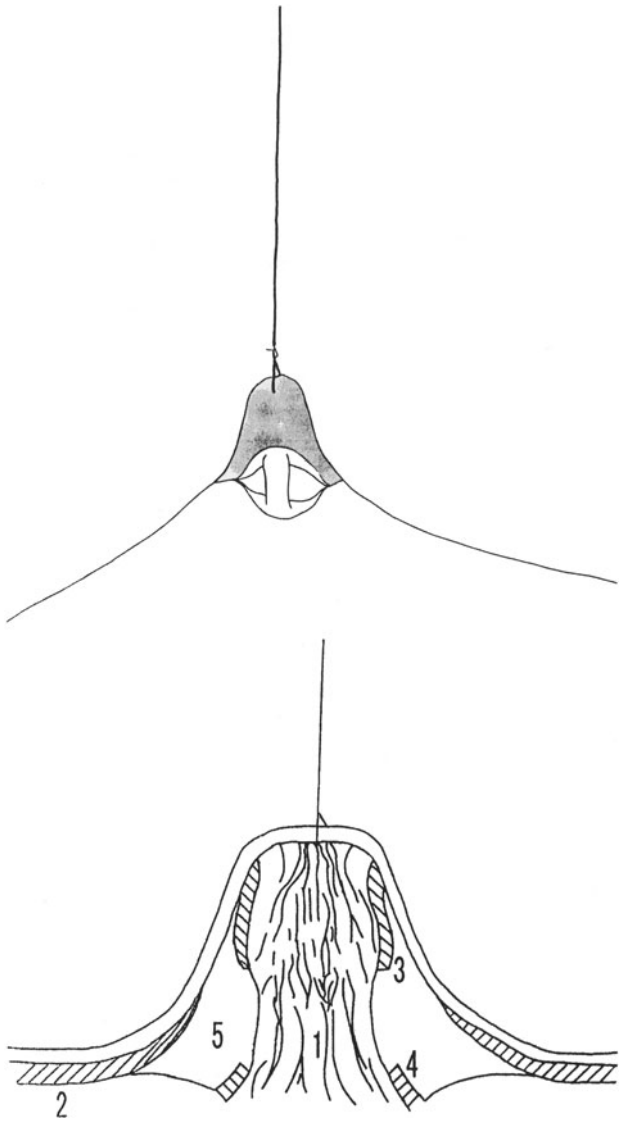

Fig. 2. Left: Applying the traction suture to the nipple, a subcutaneous tunnel is made by repeated sharp splitting and stretching maneuvers with scissors. Once contracted fibrotic tissue is separated from the lactiferous ducts, the ducts are extended until the nipple is free and capable of complete eversion. It is easy to identify the lactiferous ducts. At this stage, the nipple is held in a completely projected position without traction. Right: Vertical section of the nipple–areola at this stage. (**1**) The lactiferous ducts. (**2**) The areolomammillary muscle. (**3**) The distal portion of the lacerated fibrofatty tissue and periductal fibrous tissue. (**4**) The proximal portion of the lacerated fibrofatty tissue and periductal fibrous tissue. (**5**) The soft tissue deficiency.

Results

The patients were followed up for a period that varied between 10 and 36 months. The results were satisfactory with regard to the shape and projection of the nipples for both patients and operators (Figs. 5 and 6). In addition, there were no noticeable scars, no episodes of infection, and no deformities of the areola, the nipple sensations, or the contracting functions of the areolar muscle. However, there were nulliparous patients, whose breast functions could not be ascertained.

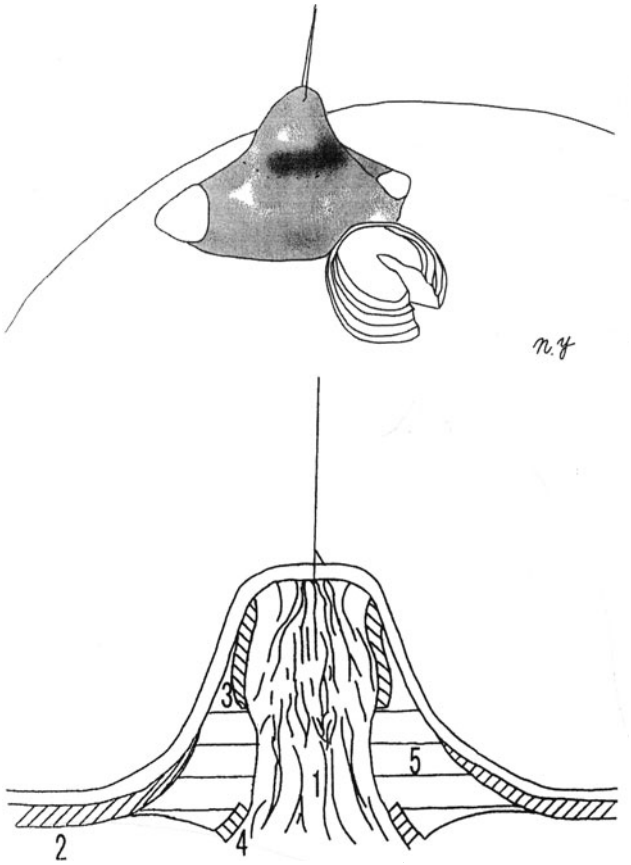

Fig. 3. Left: Artificial dermis reshaped to fit the soft tissue defficiency. Right: Vertical section of the nipple–areola at insertion of the reshaped artificial dermis. (**1**) The lactiferous ducts. (**2**) The areolomammillary muscle. (**3**) The distal portion of the lacerated fibrofatty tissue and periductal fibrous tissue. (**4**) The proximal portion of the lacerated fibrofatty tissue and periductal fibrous tissue. (**5**) The reshaped artificial dermis piled up to three layers.

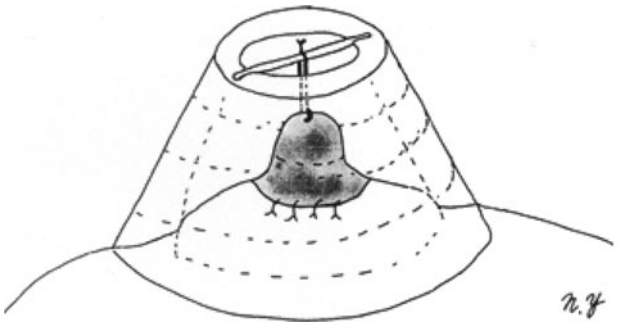

Fig. 4. Traction suture tied to the toothpick placed on top of the sponge with a hole cut centrally, allowing direct inspection of the nipple.

Discussion

The main causes of inverted nipple are retraction of shortened, undeveloped lactiferous ducts combined with resistant collagen fibers beneath the nipple and insufficient bulkiness of connective tissue beneath the nipple. Surgical procedures are required to address these causes.

Various surgical methods to correct this condition have been reported. Although a satisfactory outcome has been reported with most techniques, each method carries a drawback inherent in the technique itself including complicated operative technique [1–8,10–21], sensory disturbance of the nipple, marked scarring of the nipple areola and other donor regions, destruction of breast function, and incomplete correction. Clinical application of artificial dermis comprising a complex of collagen and chondroitin sulfuric acid was first reported by Yannas and Burke [22,23]. Since then, many attempts have been made to apply clinically parmanent collagen skin substitutes, which introduce host cells and vessels into the spongy collagen matrix and are replaced gradually by the host tissue [9]. These skin substitute have been used for reconstruction of skin defects with a very high acceptance rate, little wound contraction, and adequate thickness of the resulting skin.

We tried to use these advantages of the artificial dermis to correct inverted nipples. The method we present addresses the physiopathology of the inverted nipple by freeing the fibrofatty tissue and the periductal fibrous tissue through simple incisions on the edges of the areola, and by promoting the ingrowth of neoconnective tissue that will fill the resulting defect and gradually replaced the artificial dermis with the host tissue, thus forming the bulk necessary to support the nipple and preserving contracture. It was not necessary to cut all the lactiferous ducts in this procedure, so, theoretically, there was no disturbance to lactation. This method is very simple in concept and procedure without a complicated design, it preserves function theoretically and does not require another donor region, much time, or advanced skill.

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Fig. 5. Case 1. Upper left: A 23-year-old nulliparous woman. Preoperative appearance of bilateral congenital inverted nipples. Above right: Lateral view. Middle left: Two incision lines (1.5 cm) designed at the 3 and 9 o'clock positions along the edge of the areola. Middle right: By freeing the fibrofatty tissue and the periductal fibrous tissue through the simple incisions on the edges of the areola, the nipple is completely everted, making it easy to identify the lactiferous ducts. Bottom left: Postoperative view at a 14-month follow-up visit with inconspicuous scar and without deformity of the areolas. Below right: Lateral view showing good projection of the corrected nipple.

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Fig. 5. Continued.

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Fig. 6. Case 2. Upper left: A 19-year-old nulliparous woman. Preoperative appearance of bilateral congenital inverted nipples. Upper right: Lateral view. Bottom left: Postoperative view at a 10-month follow-up visit with inconspicuous scar and without deformity of the areolas. Bottom right: Lateral view showing quite satisfactory results.