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## Reply: Understanding the Fascial Supporting Network of the Breast: Key Ligamentous Structures in Breast Augmentation and a Proposed System of Nomenclature

***Sir:***

We believe the insertion of the triangular fascial condensation is important in the development of the constricted or tuberous breast and hence the type 2 double-bubble deformity.[1]

The density of the triangular fascial condensation insertions was observed to vary in the cadavers, depending on the configuration of the lower pole (i.e., whether there was constriction or a large ptotic breast). Unfortunately, due to the relatively low incidence of tuberous breast deformity, it was not observed in any of the cadaveric specimens; however, some constricted breasts were observed.

As well as the oblique fibers of the triangular fascial condensation seen in sagittal sections, the condensation also has radial fibers running perpendicular to these along the length of the fold. The amount and density of the criss-crossing insertions here create the degree of constriction of the lower pole, and also the degree of fold definition. Figure 1 shows an inframammary fold that was excised as a strip down to pectoral fascia and dissolved with sodium hydroxide, demonstrating these fibers.

During breast augmentation, those with a well-defined fold and constricted lower pole are predisposed to development of a sling-like indentation in the lower pole of the breast, where the triangular fascial condensation inserts directly into the dermis. Prevention of the double-bubble deformity in these patients requires the selective release of fibers of the triangular fascial condensation in multiple directions to unfurl the constricted lower pole and break up the insertion point to the level of the dermis. This requires division through the oblique running fibers from the fifth rib and pectoral fascia to the lower pole as well as radial scoring in a direction perpendicular to this, to address constricting fibers running parallel to the inframammary fold. Often, these bands are palpable, and it is usually possible to satisfactorily release the triangular fascial condensation by strategically incising just these tight bands of fascia. Finally, the dermal insertion of the triangular fascial condensation must be addressed, and in this region, selective release of this fascia until the visible fold disappears as a surface landmark should be performed.

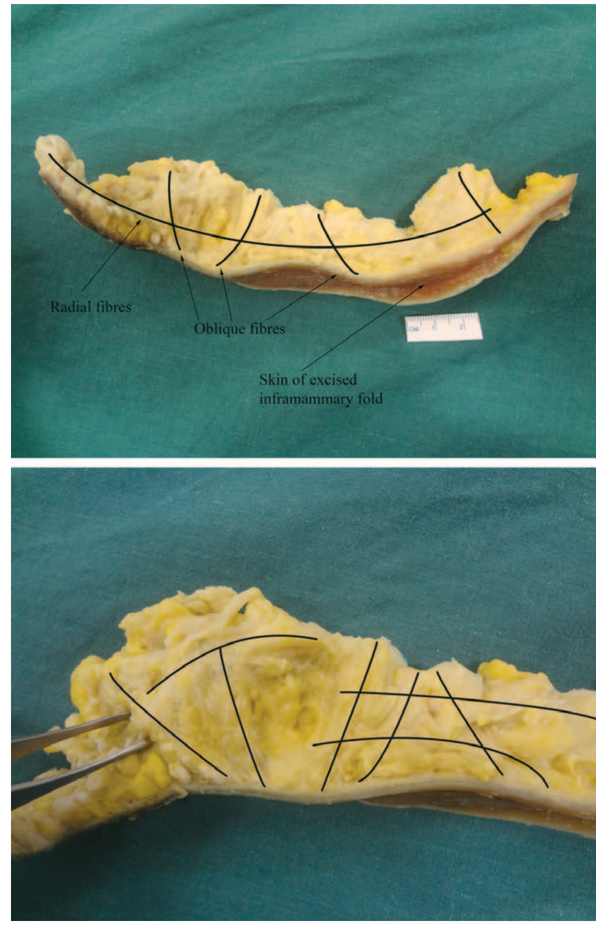


**Fig. 1.** Excised strip of inframammary fold dissolved with sodium hydroxide, demonstrating radial and oblique fibers of the triangular fascial condensation.

We have just completed a magnetic resonance imaging study that has demonstrated differences in the triangular fascial condensation in various breast shapes; some tuberous breasts have been included. Figure 2 shows the difference between a tuberous breast and a large ptotic breast in a sagittal magnetic resonance imaging study. The tuberous breast has a triangular fascial condensation with dense, closely interspersed ligamentous fibers with multiple insertions into the inframammary fold and lower pole. This is compared with the large ptotic breast (with a normally developed lower pole), which has a much less fibrous triangular fascial condensation, with stretched sparse ligamentous connections and a greater degree of fatty infiltration.

There is also much controversy when describing the histology of the inframammary fold. Boutros et al.[2] stated that there is no evidence of a ligamentous structure in the area of the inframammary fold, and that it is an intrinsic dermal structure consisting of regular arrays of collagen held in place by a zone of adherence that is a specialized area of the superficial fascial system.

Muntan et al.[3] described that the superficial fascia can be connected to the dermis in the fold region in a


**Fig. 2.** Sagittal magnetic resonance imaging sections comparing the configuration of the triangular fascial condensation in a tuberous breast (*left*) and a large ptotic breast (*right*).

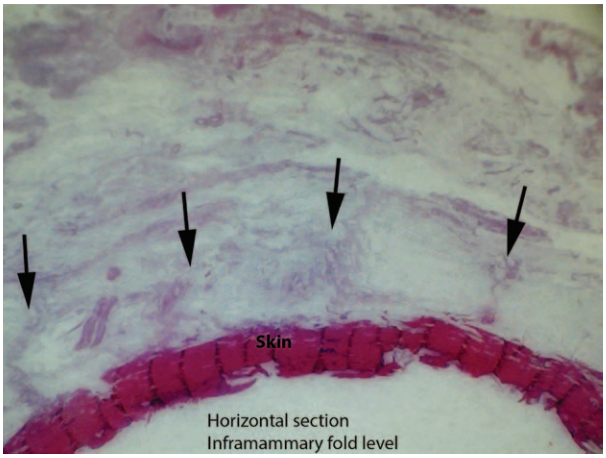


**Fig. 3.** Hemotoxylin and eosin–stained histology specimen of a horizontal section through an inframammary fold demonstrating regular glandular arrangement; each *arrow* points to an eccrine gland with a fatty deposit beneath.

variety of configurations; either the deep fascia is fused with superficial fascia at the fold level or bundles of fibers arising from the superficial fascial layer insert into dermis at the inframammary fold.

Our preliminary studies have shown that there is no superficial layer of fascia at the level of the fold; however, it continues both above and below the fold. No difference in the structure of the collagen in this region has been found, and elastic fiber content is the same as that seen in other parts of the breast. We have, however, found a regular arrangement of eccrine glands occurring every few millimeters along the length of the fold, with a distinct fatty deposit deep to each gland. Figure 3 shows a transverse section through the fold demonstrating this regular glandular arrangement; each arrow points to an eccrine gland with a fatty deposit beneath.

There was no well-developed triangular fascial condensation in the male breast cadavers. However, there was a definite adhesion point at the level of the fifth rib arising between the intermuscular septum of the rectus abdominis and the pectoralis major (which appears to be what Dr. Iacob and colleagues have demonstrated in their dissection). In male specimens with gynecomastia, there was expansion of the lower pole of the breast and a more defined fold.

It is likely that as the breast develops, there is expansion of the area above this adhesion, which creates the fold structure. The lack of a superficial fascial layer in the inferior part of the breast allows the fat and glandular tissue to expand, while the chest wall tissue beneath this area is tighter and more adherent, as it once again has a superficial fascial layer. Perhaps developmentally in a tuberous breast, the superficial layer of fascia is more extensive and prevents expansion of the lower pole of the breast.

It is not possible to examine the inframammary fold region histologically in patients, as it is preserved in all surgical situations, which limits its examination to cadavers. It would also be interesting to examine the fold in younger specimens and to observe its development; however, younger cadaveric specimens tend not to be available.

We thank Dr. Iacob and colleagues for their interest in our work.
DOI: 10.1097/PRS.0000000000000542

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## ACKNOWLEDGMENTS

*The authors thank Dr. Bruno Giuffre, Royal North Shore Hospital, Sydney, Australia, for magnetic resonance imaging studies, and associate professor Adrienne L. Morey, St. Vincent's Hospital, Sydney, Australia, for the histology studies.*

## DISCLOSURE

*The authors have no financial conflict of interest to disclose.*

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## Management of Congenital Radial Longitudinal Deficiency: Controversies and Current Concepts—An Important Correciton of the Donor Site

***Sir:***

In the article by Wall et al. entitled "Management of Congenital Radial Longitudinal Deficiency: Controversies and Current Concepts" (*Plast Reconstr Surg.* 2013;132:122–128),[1] there are a couple of serious problems on page 127 concerning the description of the alternative techniques for correcting radial deviated position of the carpus and hand in radial aplasia types III and IV. The authors have referred to the Vilkki (name misspelled in the text and in the references) technique[2], which originally uses a free microvascular transfer of the second metatarsal joint; the whole second ray is removed and the length of the second metatarsal bone and the proximal phalanx are used in the transfer. The same joint and bone taken from the first foot ray would induce serious donor-site morbidity in a growing child. Therefore, the given current concept is dangerous and misleading.

The same mistake seems to have taken place when the authors describe their own recommended treatment method for a type III or IV radial longitudinal deficiency later on the same page. The authors give their recommendation to consider a microvascular transplantation of the first metatarsophalangeal joint to the radial side of the wrist. This recommendation seems to be dangerous for the donor foot and clearly induces noncorrectable permanent problems. In contrast, the donor site after second ray removal is commonly very acceptable (Fig. 1).

**Fig. 1.** The feet 8 years after bilateral second ray removal in an 11-year-old girl.

The inaccurate reading of given references 28 and 29 and inadequate understanding of the foot as a donor site have apparently been the reasons for the described inaccuracies. The given example in Figure 6 apparently shows a second metatarsophalangeal joint as a stabilizer for the wrist. The configuration of the new wrist after reconstruction is possibly not allowing a good range of motion as the metatarsal joint level differs considerably from the original wrist level or the joint has remained too proximally situated. An example of a better alignment after the same procedure is provided (Fig. 2) for further reference, because the too proximal positioning of the second metatarsophalangeal joint is the commonest practical mistake when the Vilkki technique is used for the first time. In addition, other references to my original technique[3] and two recent references on the subject[4,5] are included. One is about donor-site morbidity. A second reference describes the everyday variation seen in radial dysplasia patients and should further influence the selection of treatment methods and their needs. This letter is just a warning to not use the first metatarsophalangeal joint or the first metatarsal bone for wrist stabilization in radial aplasia. Instead, the second metatarsal bone and second metatarsophalangeal joint with removal of the whole ray is recommended when a growth transfer is indicated.

DOI: 10.1097/PRS.0000000000000395

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