

Iginio Tansini revisited

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Abstract. – The origin of the musculocutaneous latissimus dorsi flap dates back to 1906 when Iginio Tansini, an Italian surgeon, described a procedure to reconstruct the mastectomy defect. After a detailed study of Tansini's original description and drawings, new insights about the pedicle of its compound flap have been found, showing that it has the same pedicle of the scapular flap. In the end, Tansini's flap should be more correctly considered as a compound musculocutaneous scapular flap.

Key Words:

Latissimus dorsi flap, Tansini flap, Breast reconstruction, Breast surgery, Autologous breast reconstruction, Breast cancer, Scapular flap.

Introduction

In the 1970's, surgeons from Germany and USA claimed to discover the musculocutaneous latissimus dorsi flap for breast reconstruction. However, in a beautiful paper, the renowned American surgeon, Dr GP Maxwell, gave credit to Iginio Tansini, an eminent surgeon born in Milan, Italy, in 1855 for the first original description of this flap¹. In the early 1980s, it was the first purely autogenous method of breast reconstruction² and in the 1990s it started to be used to fill defects following quadrantectomy or wide local excision².

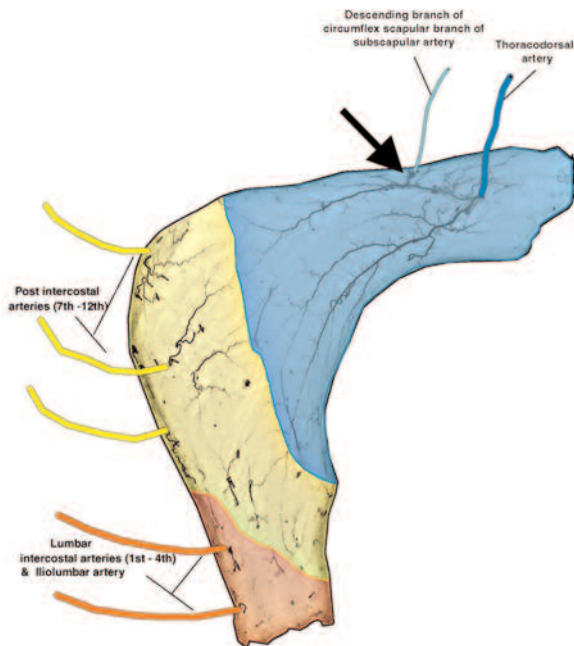
Iginio Tansini completed his medical training at the University of Pavia, an important University in Northern Italy. His mentor was Professor Enrico Bottini, "...one of the most audacious and perfect surgeons of his time..." In 1882, Tansini became Chief Surgeon at the Greater Hospital in Lodi, and then Professor of Surgery at the Universities of Modena (1888), Palermo (1898), and finally again at Pavia (1903), following the death of Enrico Bottini. He is considered, with other distinguished surgeons like Sabbatini, Sterzi,

Pieri³, and more recently, Sanvenero Rosselli, one of the surgeons which improved and helped the development of plastic surgery in Italy⁴.

Iginio Tansini was well aware of the importance of anatomical dissections to surgeons. In his words: "...with exercises on cadavers we get the most important concepts of surgical anatomy, which parallel and complete topographic anatomy. Dieffenbach was right when he said that the history of surgery is to the history of medicine, what the history of wars is to the history of States.

*In old war ferociousness and courage were essential to soldiers, but in modern war tactics discipline is essential to power, so in modern surgery the correct indication and science distinguishes a great surgeon, and victory will be for those who study and not just solely to those who are audacious. Composure during surgery is the result of knowledge."*⁵.

As we know, Tansini's surgical technique dates back to 1896, when he described his cutaneous flap harvested from the back, and used it to reconstruct the wound after a mastectomy. In his own words this flap was created: "...in order to achieve three goals: (1) to get a large flap for a quick repair; (2) to use thick and resistant skin, as far as possible from the breast region, and that only very rarely is involved in primary or secondary recurrences; and (3) to avoid scarring and retraction in the axilla, as can happen after an axillary lymphadenectomy, because very often we see the scar adhering to the big vessels and nerves, limiting any arm movement, and sometimes critically compressing the axillary vein...". After experiencing regular necrosis of the distal third of the skin flap, in association with the transection of vessels coming from the circumflex scapulae vessels, he described his musculocutaneous flap in 1906, which avoided this complication. While Tansini was proposing his musculo-



Latissimus Dorsi

Figure 1. Angiosomes of the latissimus dorsi.

cutaneous flap other surgeons during this time were proposing a pedicled median transfer from the opposite breast to gain enough tissue for the required reconstruction.

Tansini's technique had great clinical success until the 1930's, but was later abandoned, probably due to oncological issues. There are reports that this flap was used extensively throughout Italy and Europe by: Campari from Lecco; Cignozzi from Grosseto; Crosti from Milan; D'Este from Treviglio; Ajello from Palermo; Uffreduzzi from Turin; Thevenard from Paris; and Guibè from Caen, who was published in the *Presse Medicale* in 1915¹. Then in the 1970's, Olivari, Schneider, Muhlbauer, and Bostwick rediscovered the *Latissimus Dorsi* musculocutaneous flap. They modified the design and technique and then published papers that resulted in the popularity of this muscle flap as a highly successful workhorse flap for breast reconstruction for decades to follow⁶⁻¹⁰.

Nevertheless, it is still commonly thought that Tansini had some misconceptions about the vascularization of the latissimus dorsi flap. In GP Maxwell's words: "...he was wrong only in thinking that the scapular circumflex artery was more important than the subscapular and thoracodorsal arteries in supplying the flap..."¹.



Figure 2. Cover of Tansini's book collecting all his papers.

New Findings

The latissimus dorsi musculocutaneous flap is an excellent source of well vascularized autologous tissue for use in breast reconstruction with a complication rate of around 9%^{11,12}.

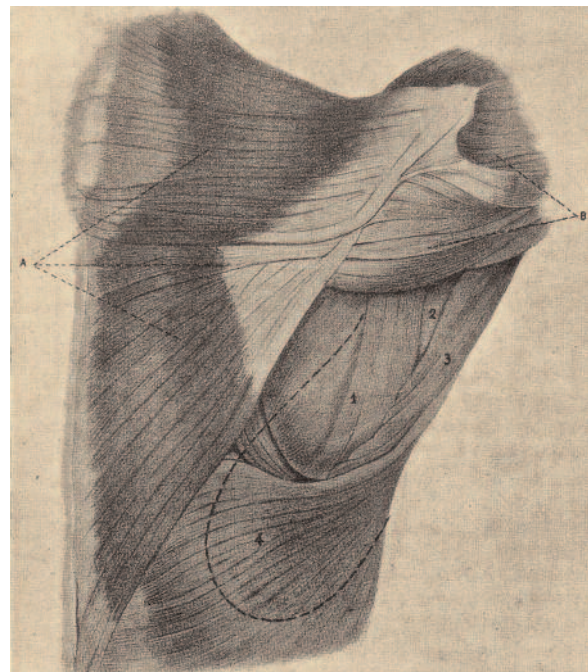


Figure 3. Anatomical preparation of the muscles involved in Tansini's musculocutaneous flap of 1906. The dotted line outlines the borders of the flap. (1) Infraspinatus muscle, (2) Teres minor, (3) Teres major, (4) Latissimus dorsi.

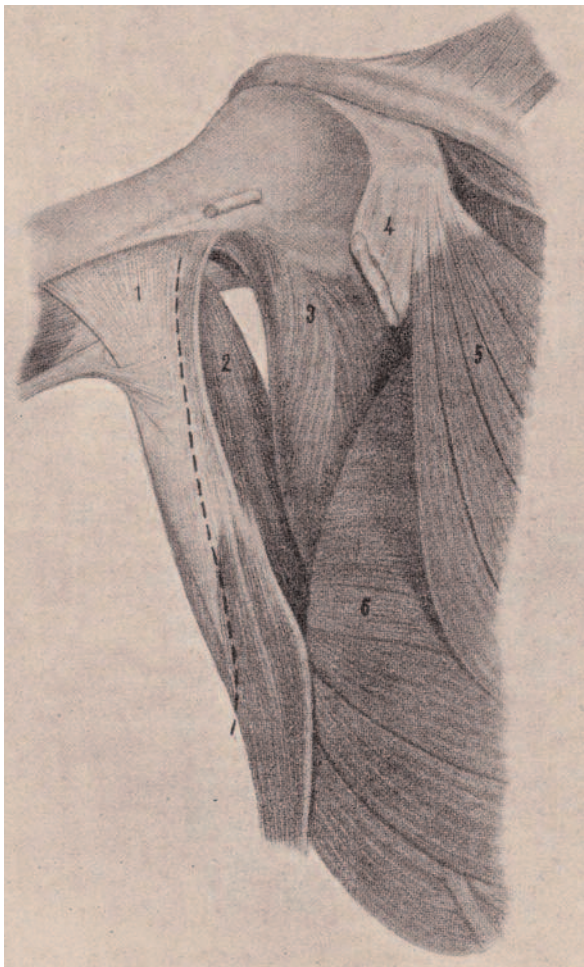


Figure 4. Anterior view. (1) Latissimus dorsi tendon, (2) Teres major, (3) Subscapular muscle, (4) Transected tendon of coracobrachialis muscle, (5) Pectoralis minor, (6) Serratus anterior muscle.

According to the classification of Mathes and Nahai¹³, the latissimus dorsi muscle has a type V blood supply, predominantly supplied by the thoracodorsal artery, which is a continuation of the subscapular artery that arises from the third portion of the axillary artery. Mathes and Nahai also recognized a segmental minor blood supply from the intercostal and lumbar arteries, which formed the basis for the turnover back flap¹³.

It has now been demonstrated that the latissimus dorsi muscle has no less than six separate blood supplies or angiosomes: the transverse cervical – superficial branch; the transverse cervical – deep branch (also known as dorsal scapular artery – DSA); the posterior intercostal vessels; the suprascapular artery (SS); the occipital artery; and of course, the thoracodorsal¹⁴ (Figures 1 and 2).

The circumflex scapular artery arises from the subscapular artery, at approximately 3 or 4 cm from its origin at the axillary artery¹⁵. The artery passes posteriorly through the triangular space giving off:

1. The *infrascapular branch*, which enters the subscapular fossa deep to the subscapularis.
2. Three muscular branches to teres major, teres minor and latissimus dorsi.
3. The *descending branch*, which goes back as its continuation and emerges posteriorly from the triangular space, and divides into two cutaneous branches, the *cutaneous scapular and parascapular branches*.
4. Several small penetrating branches that supply the lateral border of the scapula.

The circumflex scapular artery supplies the latissimus muscle via direct anastomoses with the DSA and SS vessels. This vascular contribu-

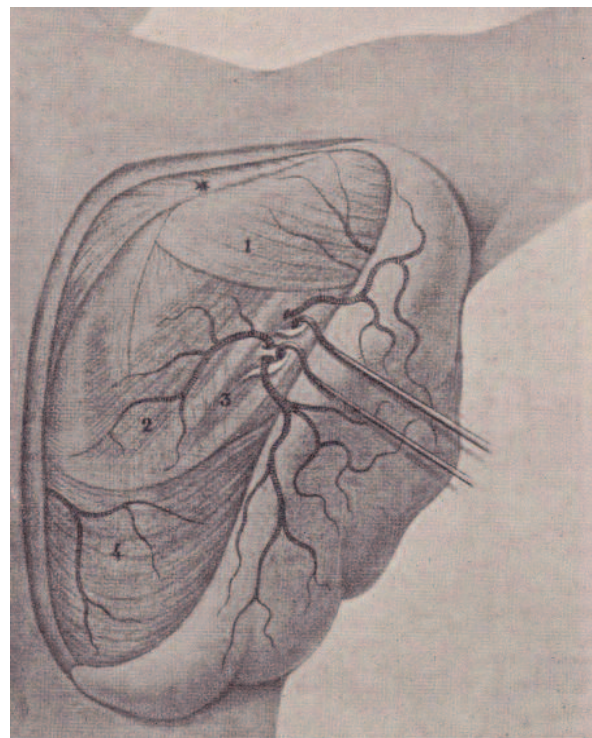


Figure 5. Anatomical preparation of the subcutaneous level of the scapular region and of the cranial part of the infrascapular region. The vessels shown actually constitute the pedicle of the scapular and parascapular free flaps. In Tansini's own words, "...there are usually three vessels coming off the circumflex scapulae (they might be two or even one, but they are always there). They arise from the triangular space, delimited by teres minor, teres major and the long head of the triceps muscle, or might even come over the superomedial margin of the teres minor or between this muscle..."

tion is well documented in old texts of anatomy, as in Testut's "Topographic Anatomy". It basically involves the proximal third of the muscle¹⁶. Recently a case was published that described a latissimus dorsi flap that survived based on the lateral thoracic artery as both the thoracodorsal and serratus branch had been divided in previous surgery¹⁷. It is probably not highlighted in modern textbooks because it is of scarce importance in rotating flaps based on the latissimus muscle.

Based on the original book of Tansini's papers⁴ (Figure 3), published in 1935, at the time of his retirement, we can now put new light into this old and fascinating topic, and requalify the Tansini flap from an anatomical point of view.

As shown in Figures 4 to 5, Tansini actually proposes the harvest of a *compound* musculocutaneous flap different from the classical latissimus dorsi. In fact, he includes the *infraspina-tus*, a part of *teres minor*, the *teres major*, and only the medial and most cranial part of the *latissimus dorsi* muscle. The skin island, as we can see, is much more cranial and medially located than the classic latissimus dorsi skin island. Tansini was well aware that his flap had a dual blood supply, one for the skin and teres muscles (coming off the circumflex scapulae), and one for the latissimus muscle (coming off the subscapular artery via the thoracodorsal artery). In his own words, also quoted by Maxwell: "...by this method we not only preserve the flow of blood to the skin that stems from the scapular circumflex, but also that which arrives there by way of the latissimus dorsi muscle through the inferior scapulae (i.e., the subscapular artery)..."

Furthermore, it is utmostly interesting to notice which vessels he transected in his *skin* flap (1896), and then preserved in his *musculocutaneous* flap ten years later (Figure 4). With our current knowledge, we can easily recognize the *parascapular* and *scapular* vessels, those that supply the parascapular and scapular free flaps. These vessels come from the circumflex scapular artery, after passing through the triangular space, which is delimited by the *teres major*, *teres minor*, and the long head of the *triceps* muscle. Tansini highlights this, after several dissections with an eminent anatomist from Pavia, Professor Sala, who graduated from Turin University and worked in Palermo between 1887 and 1889. In 1890 Professor Sala became assistant to the fu-

ture Nobel Prize recipient Camillo Golgi in Pavia. He was then Professor of Anatomy at the University of Ferrara, and finally in 1900 he returned to the world-renowned University of Pavia, as Professor of Anatomy.

We can finally say, after a thorough re-examination of Tansini's published anatomical and clinical work that Tansini's flap is not a latissimus dorsi musculocutaneous flap, but more correctly, a compound musculocutaneous scapular flap, and its blood supply was correctly quoted.

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Conflict of Interest

The Authors declare that they have no conflict of interests.

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