

The Past, Present, and Future of Facial Fat Grafting

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KEYWORDS

• Autologous • Fat graft • Face • Fat compartments • Rejuvenation • Aging face • Re-volumizing

KEY POINTS

- Autologous fat graft revolumization is a major adjunct to management of the aging face. Fat graft can be in isolation but is usually combined with mini-facelift and harvested from neck, jowl, or alternative sites including abdomen, arms, and knees.
- The aging face is created by a combination of loss of facial bone girth with reduced structural projection around the orbit, maxilla, and malar; relative disuse hypotrophy of facial animation muscles; fat volume decrease; and redistribution within the superficial and deep facial fat compartments.
- The aging face is associated with dermal atrophy and reduced collagen, elastin, and hyaluronic acid content with resultant loss of subcutaneous tissue tension and elasticity.
- Metaphorically, aging has been likened to the change from a grape to that of a sultana, with dehydration and loss of structure, pigmentation, and form.
- In facial rejuvenation, autologous fat graft can be injected into the superficial compartments using a fan distribution technique or into the deep fat sub-SMAS plane as a localized volume injection. Fat can be injected into muscle including frontalis.

 Video content accompanies this article at <http://www.oralmaxsurgeryatlas.theclinics.com>.

Introduction

The philosopher Confucius said “Real knowledge is to know the extent of one’s ignorance.” The concept of fat grafting is full of ignorance and misunderstanding.

No one really knows why fat graft survival is so unpredictable. No one has identified a degenerating adipocyte being replaced by a stem cell in vivo in people, although in 2015 Debels and colleagues¹ in Australia came close with an in vitro mouse model of an open wound healing under a gel cover to produce a layer of adipose tissue.

Terminology is misleading. Fat stem cells are not the primordial stem cells seen in bone marrow, thymus, or spleen. Fat stem cells are at least third-generation differentiating cells that are more likely pluripotential fibroblasts or mesenchymal cells coincidentally harvested from around vessels and nerves during suction harvest.

The theory of multiples² means that it is unlikely that the presumed inventor of fat grafting was actually the first to perform the procedure, although Gustav Neuber in 1883 has been credited as such. Nonreproducible results, fat necrosis, oil cysts, infection, and longer-term poor outcomes were likely but rarely published outcomes, because the concept was not universally accepted for decades.

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Bircoll in 1987 effectively stopped the use of fat injection for breast augmentation throughout the United States following a presentation to US plastic surgeons about micro-calcification after fat injecting into breast and a clinical conundrum with difficulty distinguishing from the calcification associated with ductal carcinoma in situ (DCIS). There were also concerns about carcinogenic potential from degradation products from lipoharvest and reinjection of fat. There was an immediate moratorium in the United States banning the use of fat graft in breast.

Emmanuel Delay published 10 year results confirming the assumed risk of breast cancer after fat grafting was not proven and were alarmist fears.^{3,4} Thereafter Coleman started to publish outcomes from fat graft to face in 2001.^{5,6}

In the United States outstanding results from autologous fat grafts are seen in buttock augmentation by Tino Mendietta, with survival of large-volume fat graft using simple tumescent fat suction and large cannula reinjection with no thought of centrifuging or layering, thus destroying many conceptual arguments.⁷

It is important to reflect on everything learned from meetings, because amazing outcomes from novel techniques cannot usually be replicated. Sometimes the eminent speakers are presenting data that dangerously sensationalize the topic, and the technique does not always stand scrutiny.⁸ Do they always get great results? If one trawls the social media pages involving some iconic surgeons in the field of fat grafting, the answer is a resounding no!

The real answer is that there is clearly some truth of success and exceptional outcomes with fat grafting, but results are

dependent on meticulous technique in both harvest and cell preparation, together with patience, good fortune, and a clear understanding of the environment that is essential for cell viability.

Important questions to be asked include

- Is it better to use a low-pressure aspiration mechanical system or simple aspiration syringe for harvest?
- Should small cannulae or large bore cannulae to harvest fat?
- Should a tumescent or dry harvesting technique be used?
- Use adrenaline and or hyalase?

Centrifuge or leave aspirate to stand and gravitationally separate? Should one include a platelet-rich environment or wash the fat graft?

Keep graft warm ischemia time to a minimum by harvesting and injecting at the end of procedure or harvest graft before surgery and cool the graft?

What is the importance of the fibrous stroma that is harvested with the lipoharvest?

It is hoped that this article and the other articles within this issue will answer at least some of these questions.

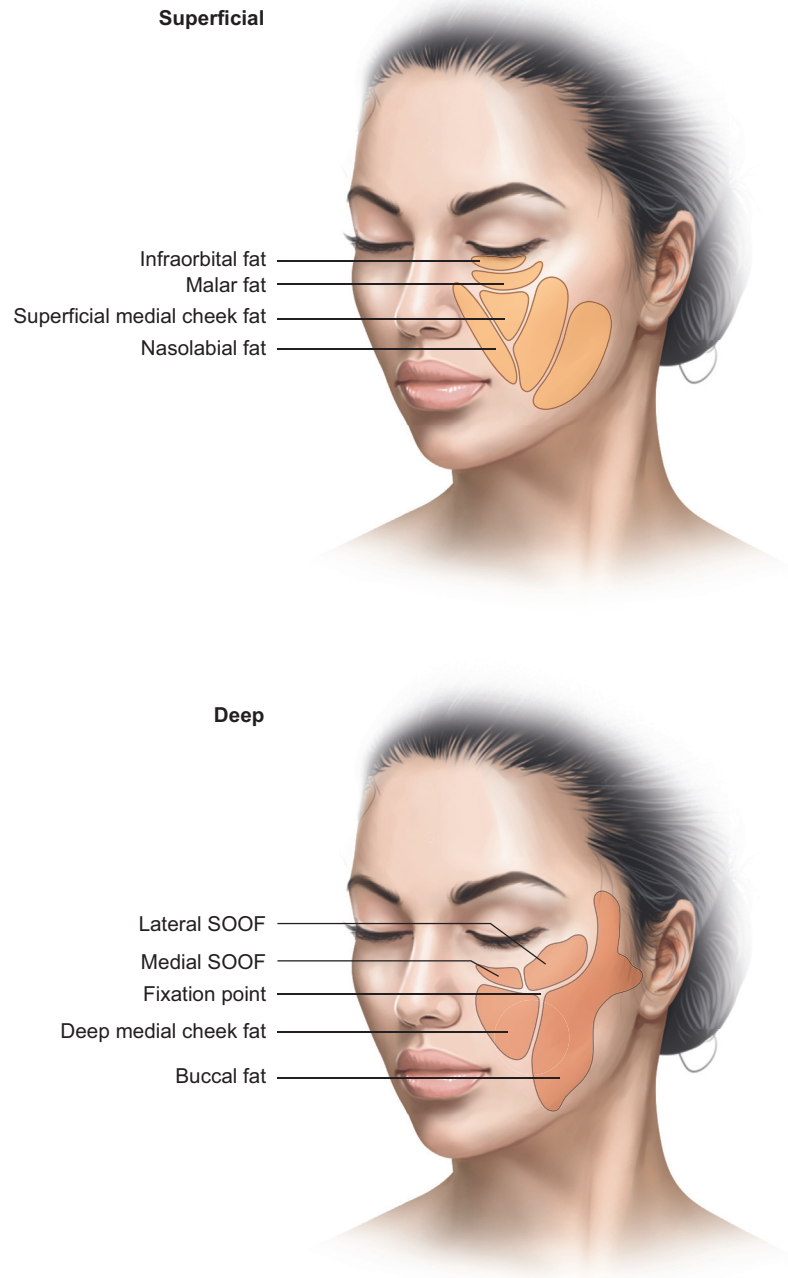


Fig. 1 Fat compartments of the face.

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