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Research Article

Dermal filler types, effect on soft tissue and life style correlation

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ABSTRACT

One of the most common manifestation in our time, especially among girls, is those procedures on the skin or maintaining or to modify some of the changes in the skin, such as those that come due to aging or any other cosmetic reasons. Fillers and Botox are two of the most popular procedures. Dermal fillers are effective treatments used to soften and reduce wrinkles and deep lines, fill out the cheeks and smooth facial contours. There are four main types of injectable dermal fillers, including fat, collagen, hyaluronic acid, and microsphere-containing carriers of another material such as polymethyl methacrylate (PMMA).So that to understand any type of injection, it is important to look at its history for valuable lessons and for successful progress. Honestly, it is very interesting to see what and where the world get in the last 40 years of injectable. Today, we will be examining the brief history of dermal fillers from their bovine collagen roots, to the advanced fillers that are available today. In this review, we aimed to show some types of dermal fillers including a variety of its complication in soft tissue. Also, we try to correlate the factor of life style with its variant effects.

Key words: Filler, soft tissue, complication, life style

INTRODUCTION

Dermal Fillers have been around for over 40 years, but have drastically changed over the years. It all started with fat transplants. In 1893, Dr. Neuber, first doctor attempts transplanting fat in order to fill out facial defects. This was the first administration of dermal filler that used as an innovative method of filling deep facial scars with fat grafted from the upper arm (Nowacki *et al*., 2014).

Throughout history, humans have experimented with different ways to improve the aesthetics of our faces and help us look younger. Numerous dermal fillers have been introduced but their clinical effects have varied. By the mid of 20th century, silicone started to be investigated and it was used from the 40s through the 50s, but the users would develop granulomas, small nodules of the foreign substance. This was definitely undesirable, and potentially dangerous therefore silicone was banned until 1992, until a safer form was developed (Matarasso *et al*., 2006).

By the 1970s, different forms of animal collagens had been researched enough to experience on humans. Collagen injections and implants were introduced by trade names for cow derived collagen ‘’Zyderm and Zyplast”. First, Zyderm was approved by The FDA, which was developed at Stanford University. Later, at the beginning of this century, newer non-bovine collagen fillers were being experienced. Meanwhile, Hyaluronic Acid fillers appeared, studied and compared to second generation non-bovine collagen in order to find which was more effective and safer. Later still, in 2006, a new family of next-generation hyaluronic acid fillers was approved by the FDA. The first one approved was Restylane®. Ultimately the synthetic fillers won out. Consequently, cosmetic surgeons now have an array of dermal fillers to choose from.

Botox is a drug made from Botulinum Toxin Type A is a neurotoxin produced by a bacteria called Clostridium botulinum. Small injected doses of the toxin paralyses and relaxes muscles in the face, which eventually makes wrinkles and frown lines less obvious (Brandt and Cazzaniga, 2008).

Dermal fillers may be utilized when patients wish to improve their appearance or for numerous other clinically appropriate instances, such as nonsurgical rhinoplasty or treatment for acne scaring. Treatment with dermal fillers is a type of soft-tissue augmentation1-3 that comprises 2 clinical categories, depending on the type of application: (1) operative (invasive) applications of filling substances or small implants, commonly performed by plastic or craniofacial surgeons, and (2) injectable preparations administered by dermatologists (Vedamurthy *et al*., 2010).

Innovations in regenerative medicine and tissue engineering have advanced numerous branches of science and medicine and are applicable to many popular medical procedures. The implementation of stem cells has evoked tremendous enthusiasm among clinicians (Czajkowski, 2011; Kloskowski *et al*., 2013).

There are a variety of dermal fillers such as:

- Autologous fat
  This filler is the earliest types of injectable filler that used for scar reconstruction. Over years, it has been decline due to decreased efficiency (Buck *et al*., 2009).

- Bovine Collagen
  The problem with this type of filler was that bovine collagen is foreign to the human body, so a sensitivity test was needed to ensure your body could tolerate it and wasn't allergic. Bovine collagen also had a lot of swelling associated with it and did not have long-lasting results. What is more shocking than the use of bovine collagen is the fact that it still exists today. Bellafill is a bovine collagen filler approved for the treatment of nasolabial folds and moderate to severe facial acne scars, that you can still get today. The industry knew that a better product was needed (Kontis, 2013).

Hyaluronic acid

Bovine collagen, as well as some human collagen fillers, were used up until the early 2000's when the FDA approved the use of hyaluronic acid fillers, which ultimately changed the game for dermal fillers. Hyaluronic Acid is a natural substance that is already found in our bodies. We have previously written and raved about Hyaluronic Acid products. These products last much longer than collagen fillers, which contributed to their instant fame and success. HA owes most of its success to the fact that it is a substance the body produces naturally. It is, thus, extracted and reformulated to make this highly-successful dermal filler (Ginat and Schatz, 2013).

Some of its common use cases today are on:

- Acne scars
- Depressions in the cheek
- Crow's feet (occurring at the corner of the eyes)
- Frown lines (around the eyebrows)
- Lines at the corners of the mouth
- Smile wrinkles and
- Facial scars, to mention but a few.

Polylactic acid (PLA)

Unlike HA above, PLA is not naturally occurring. However, that does nothing to take away from the effectiveness of this dermal filler. Available and packaged as Sculptra, it works by stimulating your own body to create even more collagen which are body building proteins important for maintaining the freshness and elasticity of your skin. This mode of operation defines why the effects of PLA are not as fast as many other dermal fillers. Over time, though, you are sure to see the new glow that this filler has injected into your skin (Buck *et al*., 2009).

If you are going for procedures to:

- Fix lines from laughing
- Fill thin lips or
- Address nasolabial folds of varying depth, this is the pick for you.

Calcium hydroxyl apatite

Calcium hydroxyl apatite is naturally occurring in the human bones, meaning you will not be exposing your body to anything it does not already know about. The deal is bettered in the sense that the substance is synthesized through biological processes. In other words, nether animals nor animal products were used, reducing your chances of getting an allergic reaction (Graivier *et al*., 2007).

Over the years, cosmetic surgeons have used this filler to address:

- Nasolabial folds of varying depths
- Marionettes and frown lines
- Lack of fullness in the cheeks, and so much more.
- With the promise of a very natural result and little to no side effects to boot, it has one of the longest safety records in the business.

Polyalkylimide

It is the fact that it rarely reacts with human tissue. This makes it unnecessary to even perform an allergy test in the first place. Besides that, though, this dermal filler is also a powerhouse when it comes to:

- Improving the volume in lips
- Enhancing cheekbones
- Boosting the jawline
- Replacing facial volume lost due to aging
- Restoring wasted face from HIV medications, among other things.

Another plus point for polyalkylimide is that a single injection can bring with it a lot of volume, representing a great value for the money (Fulton *et al*., 2012; Thioly-Bensoussan, 2008).

A major advance in dermal fillers over the years comes with the introduction of lidocaine mixed in with the filler. Prior to this advancement, none of the dermal fillers had a numbing component and many injectors thought that lidocaine took away from the effectiveness of the product. So patients endured the slight pain associated with the procedure. Now, many dermal fillers have the lidocaine mixed in during manufacturing, and can help reduce the discomfort some patients feel. Another big advance is not necessarily in the makeup of these fillers, but in how they are injected. Microcannulas are an alternative to the traditional needle, and depending on the injector's preference, can be used to insert the filler. We will discuss more on microcannulas next week (Bachmann *et al*., 2009).

The dermal filler has come a long way over the years and will only continue to develop. There are so many options available today, each one different than the next. It is important to find an experienced injector that can recommend the right dermal filler for you, and inject it properly to produce desired results.

Site : What can dermal fillers correct?

Different types of dermal fillers are designed to treat varying signs of aging. Depending on the filler selected, they may:

- plump up thinning lips
- enhance or fill in shallow areas on the face

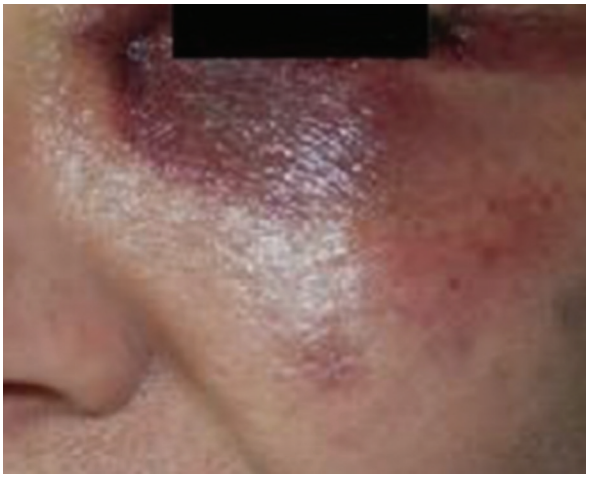
- decrease or remove the shadow or wrinkle under the eyes caused by the lower eyelid
- fill in or soften the look of recessed scars
- fill in or soften static wrinkles, especially on the lower face

Dermal filler risks and considerations

All fillers are associated with a risk of both immediate and/or long-duration complications. Some of these adverse reactions are mild and transient but others are more serious leaving patients with permanent functional and aesthetic deficits. So, the reactions could be categorized into immediately or delayed onset (Carruthers *et al.*, 2008).

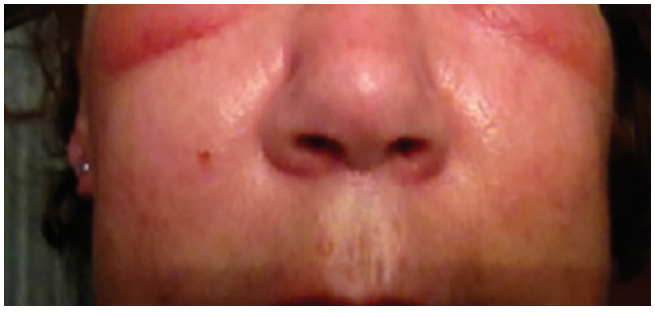
Bruising

Bruising is observed as immediate reaction and could be treated with cold compresses after the procedure and vitamin K cream (Shah *et al.*, 2002).



Edema

- Short-term post-traumatic edema
  Some transient swelling in the immediate postprocedural period is normal and occurs very shortly after injection and is related to injection volume and technique. The majority of cases of postinjection, trauma-related edema dissipate within one week (Haneke 2016).



- Antibody-mediated edema (angioedema)
  Dermal fillers are foreign bodies, and could develop hypersensitivity due to an immunoglobulin E (IgE)-mediated immune response (Type I hypersensitivity reaction). This may occur after initial or repeated exposure. IgE mediate degranulation of mast cells that release several mediators ''proteases, heparin, histamine, cytokines, prostaglandins, leukotrienes, and platelet-activating factor". Angioedema occurs within hours of exposure and may be severe. It either confined to the injection sites or more generalized (Beer 2007).
- Nonantibody-mediated (delayed) edema
  Delayed hypersensitivity reactions are mediated by T lymphocytes and typically occur one day after injection but also be seen as late and may persist for many months (Arron and Neuhaus, 2007).
- Malar edema
  Malar edema is a serious complication that has been reported with all fillers when injected into the infraorbital hollow and tear troughs. It arises because the malar septum, a band of connective tissue, divides the superficial suborbicularis oculi fat into a superficial and deep compartment. The superficial compartment has compromised lymphatic drainage, while the lymphatic drainage of the deep compartment is contiguous with the cheek drainage (Cohen and Bhatia, 2009).

Skin discoloration

- Erythema
  Some skin redness is normal but if persists for more than a few days, a hypersensitivity reaction is claimed.
- Neovascularization
  New capillaries, arterioles, and venules at the site of dermal filler injection occured. These tiny vessels appear days or weeks after the procedure, but should fade within 3–12 months. They are caused by tissue trauma as a result of tissue expansion by the product and/or by excessive molding and massage of the product (Taylor, 2009).
- Hyperpigmentation or Dyspigmetation
  The skin has a tendency to be hyperpigmented following procedures due to postinflammation 23,24. Dyspigmentation occur when particulate HA fillers are inappropriately implanted into the superficial dermis or epidermis. This results in a bluish hue may appear and scattered (Heath and Taylor, 2011).

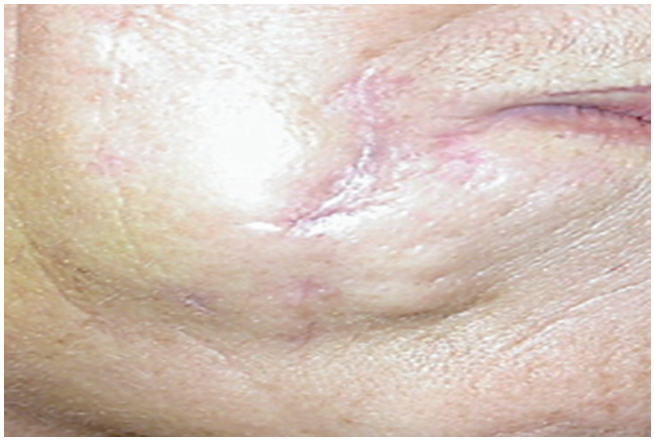
Infection

As filler procedure breaks the surface of the skin, several forms of injections could occur such as (Funt and Pavicic, 2013).

- Erysipelas and phlegmon
  They are diffuse inflammation of the skin or connective tissue due to infection.
- Abscess
  Abscess formation is a rare complication that occur at any time and may persist for weeks, and periodically recur for months.
- Herpetic outbreak
  Filler injections can lead to reactivation of herpes virus infections . Shingles after injection is very rare. When a blistering reaction occurs outside of the areas of recurrent herpes simplex virus infection (lip skin and vermillion, nasal mucosa, and mucosa of hard palate), vascular compromise should be seriously considered.

Nodular masses

Nodules are frequently observed after soft tissue augmentation. As they can arise from a number of causes, investigation may be required to establish a diagnosis. Visible material is more common in areas of thinner skin. Nodules must be categorized as inflammatory or noninflammatory (Narins *et al*., 2009).



Paresthesia

Inadvertent nerve damage is a rare complication of filler procedures and can occur as result of direct trauma where the nerve is pierced or partially lacerated by the needle, injection of filler into the nerve, tissue compression by product, and by excessive molding and massage of product into a nerve foramina. Nerve injury may be transient and reversible, or permanent (Kwon *et al*., 2013).

Tissue necrosis

Impending tissue necrosis may occur as a result of inadvertent injection of filler into vessels supplying the mucosa or the skin, resulting in vessel occlusion. During injection, the filler may flow antegrade, retrograde, or both in the vessel. Once the pressure from the injection is stopped, the product is carried through the vasculature and may result in local or distal necrosis with disastrous consequences (Imagawa *et al*., 2001).

Dermal fillers are considered to be safe but side effects can occur. The most common problems that may arise due to several lifestyle as:

- Food: some type of food like fatty food , spicy food , chocolate , which known to cause increased oil skin and the food which have irritants effect on the GIT may induced some reaction resemble to it .
- Atmosphere: hot weather and Air humidity may induce some change in the injected filler.
- Use of other cosmetics: cheap, not guaranteed cream or other cosmetics may worsen the effect of filler and lead to some changes.
- Non sterile injection tools: In some clinics or even in non-Ministry of Health control centers such as some salons, there may be a lack of hygiene and disinfection, leading to the transmission of bacteria or any type of infection through the injection needle.
- Genetic: related to the person and personal different
- Unknown : not related to any mentioned caused

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