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RESEARCH ARTICLE

EVALUATION OF THE EFFECTIVENESS OF GENIOPLASTY USING BIOPOLYETHYLENE (Su-por) IMPLANTS

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Abstract

Background: The chin an important aesthetic unit of the facial structure and play a key role in the appearance of the face. This study evaluated the surgical results of genioplasty using a Biopolyethylene implant (Su-Por).

Material and Methods: The study included 42 patients with a follow-up period of 3 years who underwent genioplasty in the clinic from 2020-2023.

All patients underwent a standard clinical examination and computed tomography (CT). To plan the required volume of chin augmentation, cephalometric analysis is used. The genioplasty surgery was planned on a 3D model of the skull, installing standard bioimplants on the 3D model of the obtained 3D printed CT image. Genioplasty was performed using a Biopolyethylene implant (Su-Por).

Outcomes were assessed using the Outcome Assessment, consisting of a 10-item questionnaire completed preoperatively, 6 months postoperatively, 1 and 3 years postoperatively.

Result: Among the 42 operated patients, no complications were observed during the operation. Complications were noted in the long-term postoperative period: swelling in 4 patients, in 2 patients with unsatisfied aesthetic results without other serious complications. In all clinical observations, stable support of the Biopolyethylene implants.

The mean score was 26.4 at preoperative assessment, 78.2 at 6 months postoperatively, and 87.6 at 3 years postoperatively. The surgical results showed favorable aesthetic results, low infection rates, strong implant fixation, good skin texture/skin/soft tissue thickness. This technique is simple and effective and is recommended for inclusion in the practice of a facial plastic surgeon.

Conclusions: Augmentation genioplasty using the Biopolyethylene implant is a simple and effective surgical procedure that can lead to aesthetically acceptable results with minimal pain using. Patients are satisfied with the aesthetic and functional results genioplasty.

Keywords: *chin, 3D model; Augmentation genioplasty; Biopolyethylene implant.*

Introduction

Facial proportions are critical to good facial aesthetics and this balance is vital to achieving an acceptable aesthetic result.[1,2]

The position of the chin is important to establish the correct facial profile and symmetry of the face.[3-5]

If the proportions of the chin are disturbed, genioplasty is performed to achieve balance in the lower third of the face.[6]

To correct cosmetic and functional deformities, it is carried out by using various methods of chin augmentation.[7]

There are many different surgical techniques genioplasty described in the scientific literature, using osteotomy, chin implantation or fillers.[8-10]

For many years, horizontal osteotomy was performed to enlarge the chin. Genioplasty has a significant effect on facial symmetry. Indication Genioplasty in case of mild to modest retrogeny, microgenia and deviated chin.[11-13]

Genioplasty can be performed using existing chin bone or an implant that is placed on the top of the chin bone between the bone and surrounding soft tissue.

Horizontal osteotomy of lower border of mandiblular symphysis through the intraoral approach was first introduced by Richard Trauner and Hugo Obwegeser.[14]

Osseous (bony) genioplasty or "sliding genioplasty" uses the patient's existing chin bone. A sliding genioplasty is performed by accessing the chin bone through an incision inside the mouth after making a horizontal incision under the teeth, the bone is moved forward and/or down to the desired location and held there with a plate and screws.[15]

Horizontal osteotmy of chin can correct a horizontal or vertical deficiency or excess of chin. Indeed, osseous genioplasty is a flexible and versatile procedure. Produces the same satisfactory result as osseous genioplasty in cases of mild to moderate horizontal chin deficiency. This is also optimal, reducing the risk of rejection that can sometimes occur when installing an implant. However, not all patients agree to osteotomy.[16,17]

Now alloplastic chin implants and sliding genioplasty are the main accepted methods of chin augmentation. Genioplasty using various bioimplants as well as various manipulations on the chin.[18-21]

Chin implants are made of silicone or porous polyethylene, in a variety of shapes, sizes and configurations.[22,23]

Chin augmentation with implants has become popular in the recent years. For chin augmentation, the ideal treatment is silicone chin implant genioplasty, which changes the appearance of the chin and jawline. Genioplasty with chin implants is indicated for mild retrogenia or minor irregularities in the contour of the chin.[24-28]

Chin implants are made of silicone or porous polyethylene, in a variety of shapes, sizes and configurations. Silicone implants are similar to the materials used for breast implants, but they are denser. After inserting a silicone implant through an internal intraoral incision, a layer of scar forms around the implant. Because porous polyethylene implants are porous, the material allows tissue to grow into it, meaning that it will hold its position better and be less prone to infection and rejection; however, if it needs to be removed due to infection or malposition, it is more difficult to remove than silicone implant.[29]

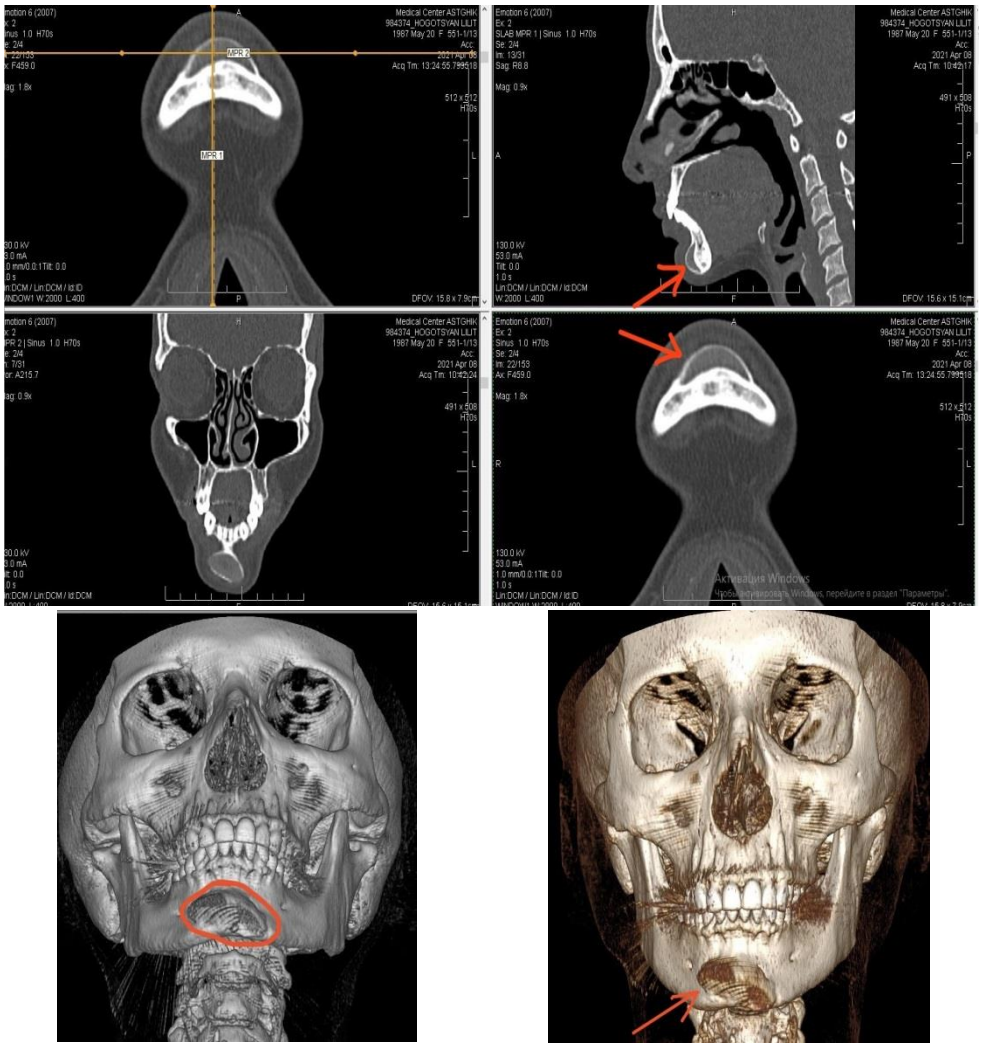
Su-Por surgical implants are used in reconstruction and augmentation of the craniomaxillofacial area, made of pure high-density polyethylene (HDPE).[30-31]

This study was conducted to evaluate the effectiveness of genioplasty using Su-Por Biopolyethylene surgical implants.

Materials and Methods

The study included 42 patients with a follow-up period of 3 years who underwent genioplasty in the clinic from January 2020 –2023.

All patients underwent a standard clinical examination and spiral computed tomography (CT). To plan the required volume of chin augmentation, cephalometric analysis is used. The genioplasty surgery was planned on a 3D model of the skull, installing standard bioimplants on the 3D model of the obtained 3D printed CT image (Figures 1-6).



Figures 1-5. *CT before genioplasty*

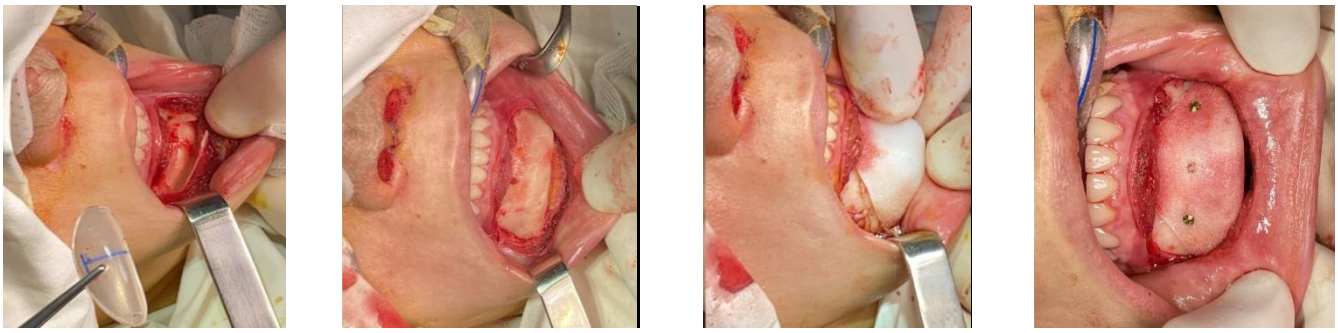
Figures 6. *3D planning on a printed model*

Surgery technique of genioplasty using a Biopolyethylene implant (Su-Por)

The operations were performed under local anesthesia with intravenous sedation and analgesia, and general anesthesia was administered to patients who were afraid to undergo surgery under local anesthesia or having undergone other operations such as facial contouring surgery, rhinoplasty or facelift procedure.

The mucous membrane of the oral cavity was cut with 2 vertical incisions in the canine area and 1 horizontal incision was connected, the mucoperiosteal flap was separated from the bone. A chin implant, created taking into account the contour

of the chin, was placed on the exposed surface of the bone in the chin area and fixed with screws, the flap was returned to its place and sutured (fig.7-10). Patients was given prophylactic antibiotic therapy for 1 week. The wound was inspected daily and antibiotic treatment was carried out, the sutures were removed after 10 days.



Figures 7-10. *Stages surgical technique of genioplasty using a Biopolyethylene implant*

Outcomes were assessed using the Outcome Assessment, consisting of a 10-item questionnaire GAIS completed preoperatively, 6 months postoperatively.

Results

Among the 42 operated patients, no complications were observed during the operation. Complications were noted in the long-term postoperative period: swelling in 4 patients, in 2 patients with unsatisfied aesthetic results without other serious complications. In all clinical observations, stable support of the Biopolyethylene implants.

All the patients showed significant improvement in facial profile, high degree of satisfaction and the resulting improved self-esteem from both procedures.

The mean score was 22.7 at preoperative assessment, 76.2 at 6 months postoperatively, and 89.6 at 3 years postoperatively. The surgical results showed favorable aesthetic results, low infection rates, strong implant fixation, good skin texture/skin/soft tissue thickness. This technique is simple and effective and is recommended for inclusion in the practice of a facial plastic surgeon.

Examples of photographs taken before surgery and 6 months after surgery are presented (Figures 11-15).

Figures 11-13. *Photographs before surgery*

Figures 14, 15. *Photographs 6 months after surgery*

Isolated augmentation genioplasty using a Biopolyethylene chin implant improved the profile and reduced sagging of the soft tissues of the neck in the lateral projection. In addition, the installation of the implant contributed to the vertical lengthening of the lower jaw in the frontal projection.

Discussion

The chin an important aesthetic unit of the facial structure and play a key role in the appearance of the face. Chin deformities can occur in various variations; (a) excessive chin, (b) insufficient chin, (c) asymmetrical chin, or a combination of these.

To solve the problem of the chin, common surgical procedure is genioplasty. There are different types of genioplasty such as advancement using osteotomy, autologous fat transfer, injection of fillers, and the use of alloimplants.[32-35]

Chin advancement after horizontal osteotomy is the gold standard for chin augmentation, however it is a complex procedure requiring general anesthesia and several days of hospitalization.[36]

Most patients prefer a simple, safe and less invasive procedure. Each technique has its own advantages and disadvantages.

Autologous grafting or filler injections are minimally invasive, non-surgical options, but require repeat procedures with unpredictable long-term results.[37]

Genioplasty using alloplastic materials is a viable alternative to both osteotomy and fat/filler injections, however there is a risk of infection, migration and damage to the mental muscles and nerves, and secondary bone resorption can damage the tooth root.[38]

This study evaluated the surgical results of genioplasty in 42 patients using a Biopolyethylene implant (Su-Por). Su-Por has excellent cross-link ability, is easy to cut and retains its shape when flexed to suit patient needs. Fixation of Such -Por Surgical Implants may be achieved using sutures, surgical fixation screws, or K-wire. Fixation screws may be placed directly through the implant without pre-drilled holes. When processed, Su-Por becomes a porous graft that allows tissue integration

This study is limited by its retrospective design and small sample size. Additionally, objective assessment tools should be used to evaluate postoperative outcomes.

Conclusions

Augmentation genioplasty using the Biopolyethylene implant is a simple and effective surgical procedure that can lead to aesthetically acceptable results with minimal pain. Patients are satisfied with the aesthetic and functional results genioplasty using a Biopolyethylene implant (Su-Po) is an effective surgical method that provides optimal functional aesthetics and results.

Declarations

Conflicts of interest and financial disclosures

The author declares that he has no conflict percent and there was no external source of funding for the research in question.

Ethical approval

The study was approved by the University ethics committee and was conducted in accordance with the Declaration of the World Medical Association.

Source of funding

This research received no external funding.

Data Availability Statement

Not applicable.

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ԲԻՈՊՈԼԻԷԹԻԼԵՆԱՅԻՆ (Su-por) ԻՄՊԼԱՆՏՆԵՐԻ ՕԳՏԱԳՈՐԾՄԱՄԲ ԳԵՆԻՈՊԼԱՍՏԻԿԱՅԻ ԱՐԴՅՈՒՆԱՎԵՏՈՒԹՅԱՆ ԳՆԱՀԱՏՈՒՄ

Աշոտ Հարությունյան,[1] Էդգար Կարապետյան,[2] Էրիկ Պետրոսյան[3]

1. Դիմածնոտային վիրաբույժ, «Աստղիկ» բժշկական կենտրոնի դիմածնոտային վիրաբուժության բաժանմունքի վարիչ,Երևանի Մ. Հերացու անվան պետական բժշկական համալսարանի Վիրաբուժական ստոմատոլոգիայի և դիմածնոտային վիրաբուժության ամբիոնի հրավիրյալ դասախոս, Երևան, Հայաստան
2. Դիմածնոտային վիրաբույժ, «Աստղիկ» բժշկական կենտրոն, Երևան, Հայաստան
3. Երևանի Մ. Հերացու անվան պետական բժշկական համալսարանի Վիրաբուժական ստոմատոլոգիայի և դիմածնոտային վիրաբուժության ամբիոնի օրդինատոր,Երևան, Հայաստան

Ամփոփում

Նպատակ. Կզակը դեմքի կառուցվածքի կարևոր գեղագիտական միավոր է և առանցքային դեր է խաղում դեմքի արտաքին տեսքի մեջ: Այս ուսումնասիրությունը գնահատել է գենիոպլաստիկայի վիրաբուժական արդյունքները՝ օգտագործելով բիոպոլիէթիլենային իմպլանտը (Su-Por):

Նյութ և մեթոդներ. Հետազոտությունը ներառել է 42 հիվանդ՝ 3 տարվա հետևողական շրջանով, ովքեր գենիոպլաստիկայի են ենթարկվել կլինիկայում 2020-2023 թվականներին:

Բոլոր հիվանդներն անցել են ստանդարտ կլինիկական հետազոտություն և համակարգչային տոմոգրաֆիա (CT): Կզակի մեծացման անհրաժեշտ ծավալը պլանավորելու համար օգտագործվել է ցեֆալոմետրիկ անալիզ: Գենիոպլաստիկայի վիրահատությունը պլանավորվել է գանգի CT պատկերի 3D մոդելի վրա տեղադրելով ստանդարտ բիոիմպլանտներ: Գենիոպլաստիկա կատարվել է Բիոպոլիէթիլենային իմպլանտի միջոցով (Su-Por):

Արդյունքները գնահատվել են արդյունքների գնահատման միջոցով, որը բաղկացած է 10 կետից հարցաշարից, այն լրացվել է վիրահատությունից հետո, 6 ամիս հետո, 1 և 3 տարի հետո:

Արդյունքներ. 42 վիրահատված հիվանդների շրջանում վիրահատության ընթացքում որևէ բարդություն չի նկատվել: Հետվիրահատական շրջանում նկատվել են բարդություններ՝ 4 հիվանդի մոտ այտուցվածություն, էսթետիկ անբավարար արդյունքներով 2 հիվանդի մոտ՝ առանց այլ լուրջ բարդությունների: Բոլոր կլինիկական դիտարկումներում դիտվել է Բիոպոլիէթիլենային իմպլանտների կայուն աջակցություն:

Միջին միավորը եղել է 26.4 նախավիրահատական գնահատման ժամանակ, 78.2՝ 6 ամիս հետո, իսկ 87.6՝ 3 տարի հետո: Վիրահատության արդյունքները ցույց են տվել բարենպաստ էսթետիկ արդյունքներ, վարակի ցածր մակարդակ, իմպլանտների ուժեղ ամրացում, մաշկի լավ հյուսվածք/մաշկ/փափուկ հյուսվածքի հաստություն: Այս տեխնիկան պարզ և արդյունավետ է և խորհուրդ է տրվում ներառել դեմքի պլաստիկ վիրաբույժի պրակտիկայում:

Եզրակացություններ. Բիոպոլիէթիլենային իմպլանտի (Su-Po) օգտագործմամբ գենիոպլաստիկան արդյունավետ վիրաբուժական մեթոդ է, որն ապահովում է օպտիմալ ֆունկցիոնալ էսթետիկա և արդյունքներ: Հիվանդները գոհ են էսթետիկ և ֆունկցիոնալ արդյունքներից:

ОЦЕНКА ЭФФЕКТИВНОСТИ ГЕНИОПЛАСТИКИ С ИСПОЛЬЗОВАНИЕМ ИМПЛАНТАТОВ ИЗ БИОПОЛИЭТИЛЕНА (Су-пор)

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Абстракт

Цель: Подбородок является важной эстетической единицей структуры лица и играет ключевую роль во внешнем виде лица. В этом исследовании оценивались хирургические результаты гениопластики с использованием биополиэтиленового имплантата (Su-Por).

Материал и методы: В исследование включены 42 пациента со сроком наблюдения 3 года, перенесших гениопластику в клинике в 2020-2023 гг.

Всем пациентам проведено стандартное клиническое обследование и компьютерная томография (КТ). Для планирования необходимого объема увеличения подбородка используется цефалометрический анализ. Операцию гениопластики планировали на 3D-модели черепа, устанавливая стандартные биоимплантаты на 3D-модель полученного 3D-печатного КТ-изображения. Гениопластику проводили с использованием биополиэтиленового имплантата (Су-Пор).

Результаты оценивались с использованием оценки результатов, состоящей из анкеты из 10 пунктов, заполненной до операции, через 6 месяцев после операции, через 1 и 3 года после операции.

Результаты: Среди 42 прооперированных больных осложнений во время операции не наблюдалось. В отдаленном послеоперационном периоде отмечены осложнения: у 4 пациентов отек, у 2 пациентов неудовлетворительный эстетический результат без других серьезных осложнений. Во всех клинических наблюдениях стабильная поддержка имплантатов из биополиэтилена.

Средний балл составил 26,4 при предоперационной оценке, 78,2 через 6 месяцев после операции и 87,6 через 3 года после операции. Результаты хирургического вмешательства показали благоприятные эстетические результаты, низкий уровень инфицирования, прочную фиксацию имплантата, хорошую текстуру кожи/кожу/толщину мягких тканей. Данная методика проста и эффективна и рекомендуется для включения в практику пластического хирурга лица.

Выводы: Аугментационная гениопластика с использованием биополиэтиленового имплантата является простой и эффективной хирургической процедурой, способной привести к эстетически приемлемым результатам с минимальной болезненностью. Пациенты довольны эстетическими и функциональными результатами гениопластики.