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Submission date: 02-Oct-2022 03:41PM (UTC-0700)
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File name: Surgery_of_Cauliflower_Ear_Deformity.docx (45.41K)
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Surgery of Severe Cauliflower Ear Deformity: Case Reports

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Introduction

Cauliflower ear is an auricular shape deformity characterized by thickened soft tissue and cartilage, resulting in an uneven shape of the ear and lack of cartilaginous support, resulting in loss of natural ear contours and permanent aesthetic deformity [1–3]. Subperichondrial hematoma or fluid collection causes this malformation. As a result of being cut off from the perichondrium blood supply, the ear cartilage becomes ischemic, developing scar, fibrous tissue, new cartilage overgrowth, or necrosis beneath the skin, resulting in a permanent alteration in the shape of the external ear resembling that of a cauliflower [1,3].

The most prevalent cause of cauliflower ear is physical trauma, which is more likely in athletes who participate in strong sports like boxers, wrestlers, or rugby players [4]Ears subjected to forceful trauma with persistent hematoma frequently develop deformity. Auricular perichondritis, bite injuries, and surgery are some of the other causes.

Yotsuyanagi et al. categorized cauliflower ear into two types: type I, which has no or only minor alterations in the ear contour, and type II, which has a significant change in the ear contour. Type I deformity was further subdivided into type IA concha deformity, type IB antihelix and helix deformity, type IC deformity all over the ear, and type ID deformity with skin defects. Type II deformity was further subdivided into type IIA (ear with acceptable structural integrity) and type IIB (ear with poor structural integrity) [5].

To avoid cauliflower ear, several treatments have been devised, including bandages and splinting, hematoma drainage with a syringe or surgical blade, bolster dressings and mattress sutures [3]. If cauliflower ear does form, the aberrant fibroneocartilage must be removed, and the ear must be recontoured [3].

We present two cauliflower ear cases that were referred to us for treatment. One patient underwent repeated auricular infection drainage and surgical treatments, while the other had multiple tumor removal surgery. According to the Yotsuyanagi classification, both cauliflower ears were type IIB.

Case Presentation

Case 1

A 25-year-old man presented with a swollen, deformed left ear along with the entire ear. Ten years ago, the patient had sudden pain and swelling in the left ear with no known cause. There was pus discharge and swelling. The patient had taken antibiotics and underwent multiple drainage procedures, first with a syringe and then with a surgical blade. However, there was scarring which worsened after each procedure, leading to cauliflower deformation of the entire ear. The patient was referred to our center as the patient complained of the shape of the ear and requested reconstruction. On physical examination, the cartilage of the left ear was thickened, and the helices had shrunk into multiple folds, forming a cauliflower-shaped deformity extending to the entire ear.

There was fluid collection in the ear. There was no hearing loss, and the tympanic membranes and auditory meatus were normal. Case 1 was classified as a type IIB deformity. The patient was a heavy smoker and had agreed to quit smoking 6 months before surgery.

Total ear reconstruction was performed under general anesthesia. Incision was made in the left auricula and scalp areas. The skin flap was elevated, the aberrant fibroneocartilage tissue was excised and eliminated, and the temporoparietal fascia flap was raised. Autogenous costal cartilage was harvested from 6th to 8th contralateral rib. Costal cartilages were sculpted and inserted into the left ear. The temporoparietal fascia flap was used to cover the framework, and vacuum drains were placed in the left auricular and scalp areas. The skin was redraped, sutured, and dressed with paraffin gauze and alginate before being covered with a thermoplastic splint. Antibiotic and pain medication were administered for 2 days post-op, the scalp drain was removed 3 days post-op, the auricula drain was removed 4 days post-op, and the splint was removed 7 days post-surgery.

The patient was advised to come to the outpatient department regularly for follow-up. After one year of follow-up, there was no visible scarring or other complications. The patient was pleased with the outcome, and an excellent shape was achieved.

Case 2

A 39-year-old man presented with a deformity of the upper left ear after undergoing several surgeries to remove soft tissue tumor. The upper two-thirds of the helix shriveled after each surgery, resulting in a cauliflower malformation. Although the patient had no complaints about his hearing, he felt insecure about the shape of his ear and came to our center requesting treatment. Case 2 was classified as type IIB deformity. The patient was also a heavy smoker and had agreed to quit smoking 6 months before surgery.

Ear reconstruction was performed under general anesthesia. A posterior approach was used to raise the skin flap in the left auricular area. The aberrant fibroneocartilage tissue was excised and removed. Autogenous costal cartilage was harvested from 6th to 7th contralateral rib. After sculpting, costal cartilages were inserted in the area where the fibroneocartilage tissue was removed. A vacuum drain was inserted in left auricula area. The skin was re-draped and sutured. Bolster dressings were applied to splint the reshaped ear. Antibiotic and pain management were used for 2 days post-op, the auricula drain was removed 3 days post-op, and the bolster dressings were removed 7 days post-surgery.

After three months of follow-up, the ear projection and shape showed promising results with no complications.

Discussion

Cauliflower ear, a term used to describe a post-traumatic auricle malformation in current terminology, first appeared around the beginning of the twentieth century. The phrase cauliflower ear first appeared in popular publications in 1905, in two pieces about John J. Ryan, the world heavyweight champion [6].

Interestingly, the malformation bears just a passing resemblance to a cauliflower and does not hold up to further examination. The cabbage family vegetable has a symmetrical and highly organized fractal geometry with well-circumscribed excrescences. Cauliflower ear, on the other hand, lacks symmetry and its rounded protuberances merge into one another. Despite being

something of a misnomer, the phrase is profoundly ingrained as a generally known moniker in both popular and medical culture [6].

Male athletes were much more likely than female athletes to have cauliflower ears. There are various explanations for this gender disparity. The mechanism of trauma is the most likely explanation. Male athletes are stronger than female athletes, resulting in more injury while training or competition [7].

Lyons et al., said that small procedures such as ear piercing can potentially result in significant complications. One of the treatments with a high complication rate is high ear piercing. Ear piercing can cause damage to thecartilage, infection and even abscess development can ensue, exacerbating the ear condition. Despite proper medical therapy, infections can spread quickly. An abscess can permanently harm the ear, and because cartilage is the framework of the ear, its absence produces cauliflower ear [8]. Both of our patients developed cauliflower as a result of earlier surgery, one after earlobe infection surgery and the other following soft tissue tumor removal surgery.

The external ear is made up of an elastic cartilage and perichondrium structure with strongly adhering overlaying skin, especially at the anterior aspect [9]. The anterior side of the auricle is made up of a thin skin envelope that is securely linked to the underlying perichondrium. In contrast, the auricle's posterior side has an extra layer of fat that enables more skin flexibility[9].

Cauliflower ear is an aesthetic deformation caused by fibroneocartilage and fibrosis [3]. Cauliflower ear sufferers seek therapy for two reasons: discomfort and aesthetic [10]. Our two patients' main issue is aesthetic deformities in their ears.

Fibrosis and neocartilage are hypothesized to be the causes of a thicker deformity in cauliflower ear. First, the blood flow to the underlying cartilage is disrupted, resulting in cartilage infection and death. Second, new cartilage and fibrous tissue are formed [3]. Cauliflower ear hypertrophic tissue can occasionally have bone-like rigidity. Mashiko et al. used computed tomography to discover excessive ossification in cauliflower ear cases [11].

Early prophylaxis should include appropriate analgesics and ear compression to avoid auricular haematoma from becoming cauliflower ear. After that, the ear should be packed with ice for no more than a period of twenty minutes until a final therapy is done [12]. The essentials of therapy include complete hematoma drainage, removal of dead space to avoid subsequent reaccumulation, consistent compression with safe and uncomplicated dressing, and proper intervention [13,14]. Pattanaik advised using an 18 or 20 gauge needle for a simple needle aspiration [15]. After concluding that needle aspiration alone is inadequate, Ghanem et al. proposed open incisions, vigorous debridement, and long-term ear bolsters [14]. Roy et al. proposed using direct mattress sutures through the anterior and posterior sides of the auricle to attach the raised subpericondrial flap to the underlying cartilage, eliminating dead space and avoiding reaccumulation. It removes the need for all forms of bolsters, same as transseptal sutures do for nasal packing to avoid hematomas following septoplasty [16].

Prior knowledge has shown that treating a cauliflower ear is difficult and unsatisfying. As a result, the goal of any treatment procedure should be to produce a near-normal look [13]. Cauliflower ear therapy should include discreet incisions, removal of aberrant fibroneocartilage without jeopardizing the ear's structural integrity, and reinstatement of the ear's natural outlines [3].

Vogelin et al. surgically repaired cauliflower ears through a posterior technique to remove the hardened section and re-sculpture a portion of remnant cartilage [10]. Greywoode et al. used a blade and a diamond burr to reconfigure the cartilage [3].

Schonauer et al. demonstrated the utilization of ipsilateral extra cartilage to reconstruct the helix via a posterior incision, advocated removal of the fibrocartilage layer, and discovered that tangential shaving was efficient in reshaping the folds as needed [17].

Because the posterior layer of the auricle is hypothetically composed of original cartilage, Fujiwara et al. stressed the necessity of preserving it after excising the anterior fibrous connective layer. If repair of any component of the auricle was required, contralateral conchal cartilage might be utilized as grafts [4].

Yotsuyanagi and et al., developed surgical treatments for the deformity, which differ depending on the level of auricle involved [5] The shape of the ear, the distorted sections, and the structural integrity all play a role in determining how to effectively rebuild the malformed cartilage. The first type of distortion is one that does not modify the contour of the ear and may be repaired by trimming the distorted cartilage using appropriate approaches. The second type of malformation is one that is characterized by an alteration in the contour of the ear. A conchal cartilage grafting is utilized if the ear is firm. If the ear's structural integrity is compromised, costal cartilage is employed to give firmness [5].

According to Yotsuyanagi et al., both of our patients exhibit type IIB deformities. That is why we used a post-auricular or post-helical incision to remove the deformed cartilage before doing costal cartilage grafting as described for microtia. We employed costal cartilage grafting in both of our cases to replace the brittle and distorted ear cartilage, restore the shape and projection of the ear, and offer strong structural integrity to the ear. Costal cartilage is used as a structure for restoration because it is robust, solid, and has a curved form comparable to the external ear [18]. It was also malleable and could be moulded to resemble natural ear outlines.

We also constructed a 3D-printed model of a healthy ear to aid in the sculpting of a costal cartilage structure that is as close to a healthy ear as possible. It is critical to ensure that the framework has an appropriate blood supply to facilitate healing of wounds and protect the viability of the costal cartilage.

In case 1, a transfixion incision with a backcut, as described by Firmin [19,20] was selected to facilitate adherence of the remnants to the retroauricular skin. This forms a space for the framework's inferior part, which, when inserted, reproduces the lobule. The transfixion incision and backcut location are examined by dragging the remnant posteriorly until it achieves the optimal position. Parameters from the healthy ear are utilized to determine the optimal location on the defect ear.

In case 2, post-helical incision, as described by Yotsuyanagi et al., [5] was selected. The triangular fossa-scapha complex, which is supplied by the upper branch of the superficial temporal arteries and the earlobe, which is supplied by the perforator of the postauricular arteries, is maintained by a post-helical incision. To prevent harm to the vascular system, the skin must be handled with care. The approach leaves an unobtrusive scar on the back of the ear and allows for adjustment of both the anterior and posterior surfaces of the cartilage.

In both of our cases, there was sufficient skin to cover the grafted cartilage without tension. However, as the affected ear in case 1 was severely deformed, despite sufficient skin availability, the thickness of the skin flap was very thin, which might impact the perfusion of the skin flap, so we decided to wrap the costal cartilage frame work with a temporoparietal fascia flap before covering it with the thin skin flap.

The postoperative care of the rebuilt ear is critical. The risk of bleeding is significant in the early postoperative period [5]. Infection, scarring, and relapse of the deformities can all result from a hematoma. In both of our cases, we used a small vacuum drain inside the flap to remove dead

space and evacuate fluid accumulation. The drains were removed when production was less than 5cc in 24 hours.

One of the most essential therapies is maintaining consistent pressure with a secure and uncomplicated dressing [13,14]. In Case 1, layers of parrafin gauze and alginate dressings were used to shape the ear contour, and a thermoplastic splint was placed on top. To highlight the reshaped ear in Case 2, bolster dressings with parrafin gauze were used on the anterior and posterior sides of the ear, which were secured with mattress suture. The color of the flap could not be seen if it was covered by a thermoplastic splint, making it imposible to determine the flap's perfusion. The bolster dressings were utilized as a precaution. If the flap is suspected of being compromised, the bolster suture can be loosened to improve flap perfusion.

Ear reconstruction for complicated cases requires a high level of detailed and meticulous management. It is not easy to use a costal cartilage framework to reconstruct a cauliflower ear that has a deformity with a significant change in the contour of the ear and poor structural integrity of the ear. It is one of the most challenging procedures in plastic and reconstructive surgery as it requires the excision of brittle and severely deformed fibroneocartilage while ensuring sufficient perfusion, structural integrity of the ear and restoring the ear's natural shape using concealed incisions to ensure aesthetic results.

Although ear reconstruction is an elective procedure, there has been an increasing demand to meet patients' esthetic and functional needs. In our patients, cauliflower deformity was caused by multiple procedures performed on the ear following acute infection and soft tissue tumor, respectively. Both had stable families and jobs and had normal auditory functions. However, they were self-conscious of their ear deformity and requested treatment to restore their aesthetic appearance. They sought treatment at our center as previous treatments had failed and a high degree of reconstruction was required. After the surgery, there was excellent recovery with no visible scars or complications. The patients expressed satisfaction and felt more confident after successful reconstruction. Therefore, reconstruction surgery not only restores the natural shape of the ears but also improves the patient's self-confidence and quality of life.

Conclusion

A cauliflower ear is extremely damaging since it results in a permanent aesthetic disfigurement. It is caused by fluid accumulation in the subperichondrial layer, which causes reduced perfusion and leads to cartilage necrosis, which is followed by the development of fibroneocartilage. The optimum therapy includes hidden incisions, removal of aberrant fibroneocartilage, and restoration of the natural shapes of the ear. Costal cartilage is used as a framework for a cauliflower ear with poor structural integrity because it is robust, solid, and malleable, and it may be molded to look like natural ear shapes. Considerations in the selection of methods, surgery techniques, drainage, and dressing choices are also necessary to give a secure and uncomplicated pressure. The effectiveness of ear reconstruction is critical in addressing the patient's aesthetic, functional, and psychological demands, as well as their overall quality of life.

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