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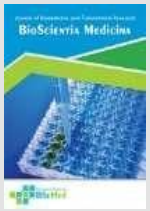

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Modified Hughes Tarsoconjunctival Flap Procedure for Lower Eyelid Defect: A Case Series

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A B S T R A C T

Background: The Hughes procedure, or tarsoconjunctival flap, is a technique used in reconstructing full-thickness lower eyelid defects involving >50% of the eyelid margin to restore anatomical integrity, function, and cosmesis of the eyelid. The modified Hughes procedure spares the marginal upper lid tarsus and removes the levator muscle aponeurosis from the tarsoconjunctival flap. This study reports a case series of patients who underwent a modified Hughes procedure after basal cell carcinoma excision. **Case presentation:** Two patients underwent lower eyelid reconstruction using the modified Hughes procedure. After a wide excision of the tumor, a tarsoconjunctival flap was created to reconstruct the posterior lamella of the eyelid. Subsequently, the anterior lamella of the eyelid was reconstructed using a full-thickness skin graft and an advancement flap, respectively. Both patients underwent a second surgery, tarsus flap release, 6-8 weeks after the first surgery. Postoperatively, tarsal flap apposition, skin flap/graft, and stitches were intact. After the tarsus flap release, wound healing was good. A tumor biopsy showed basal cell carcinoma. **Conclusion:** The modified Hughes procedure is a treatment of choice in reconstructing full-thickness lower eyelid defects involving >50% of the eyelid margin. Full-thickness skin graft and advancement flap to reconstruct the anterior lamella of the eyelid are chosen after considering skin color, texture similarity, and the laxity of the eyelid and cheek.

1. Introduction

The periocular region, encompassing the delicate structures surrounding the eye, is a frequent site for the development of basal cell carcinoma (BCC), the most prevalent form of skin cancer. The eyelids, in particular, are highly susceptible to this malignancy, often necessitating surgical intervention to remove the cancerous lesion. While surgical excision is crucial for eradicating the tumor, it inevitably results in tissue defects that require meticulous reconstructive procedures to restore the eyelid's intricate anatomy and function. The lower eyelid, being more prone to BCC compared to the upper eyelid, presents unique reconstructive challenges. Its primary functions include protecting the cornea, maintaining proper tear distribution, and facilitating eyelid closure. Any disruption to these functions can lead to significant complications such as corneal exposure, dryness, irritation, and even vision impairment. Therefore, lower eyelid reconstruction must prioritize the restoration of both anatomical integrity and physiological function.[1-3]

The selection of the most appropriate reconstructive technique depends on several factors, including the size and location of the defect, the quality and laxity of the surrounding skin, and the surgeon's experience and preference. For defects involving less than 50% of the lower eyelid margin, a variety of techniques can be employed, such as direct closure, lateral canthotomy, and Tenzel semicircular

flap. However, for larger defects encompassing more than 50% of the eyelid margin, more complex procedures are required to ensure adequate reconstruction and minimize complications. The Hughes procedure, also known as the tarsoconjunctival flap, is a well-established technique for reconstructing full-thickness lower eyelid defects exceeding 50% of the eyelid margin. This procedure involves harvesting a flap of tarsoconjunctival tissue from the upper eyelid and transposing it to the lower eyelid to recreate the posterior lamella, the inner layer of the eyelid. The anterior lamella, the outer layer, can then be reconstructed using various techniques, such as a full-thickness skin graft or a myocutaneous advancement flap.[4-7]

While the traditional Hughes procedure has been widely used, modifications have been introduced to further refine the technique and improve outcomes. The modified Hughes procedure spares the marginal upper lid tarsus, preserving the structural integrity of the upper eyelid, and removes the levator muscle aponeurosis from the tarsoconjunctival flap, reducing the risk of complications such as ptosis (drooping of the upper eyelid) and entropion (inward turning of the eyelid).[8-10] This case series presents the outcomes of two patients who underwent lower eyelid reconstruction using the modified Hughes procedure following the excision of basal cell carcinomas.

2. Case Presentation

Case 1

A 57-year-old female presented to our ophthalmology clinic with a chief complaint of a non-healing ulcer on her right lower eyelid. The patient reported that the ulcer had been present for approximately one year and had gradually increased in size over the past six months. She described the initial lesion as a small, itchy bump that she frequently scratched, which eventually ulcerated. Upon examination, a 19 x 6 mm ulcer was observed on the right lower eyelid. The ulcer involved the eyelid margin, exhibiting a clear boundary, irregular edges, and fixation to the underlying tissues. The ulcerated area appeared blackish in color, indicative of tissue necrosis and potential underlying malignancy. The lateral and medial eyelid margins remained intact, measuring 4 mm each, and the inferior lacrimal punctum was preserved. No palpable regional lymph nodes were detected. To further evaluate the lesion and determine the underlying cause, several diagnostic investigations were performed; Complete blood count: Results were within normal limits, suggesting no systemic infection or hematological abnormalities; Blood chemistry: Similarly, blood chemistry analysis revealed no significant abnormalities, indicating normal organ function and metabolic status; Coagulation profile: Normal coagulation parameters were crucial to assess the patient's suitability for surgical intervention; Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP): Both inflammatory markers were within the normal range, ruling out significant systemic inflammation; Orbital computed tomography (CT) scan: A CT scan of the orbits revealed a well-defined, heterogeneously enhancing mass measuring 1.5 cm x 1.0 cm x 0.5 cm in the right lower eyelid. The mass involved the eyelid margin and extended into the adjacent subcutaneous tissues. Importantly, there was no evidence of bony erosion or orbital invasion, suggesting localized disease; Magnetic resonance imaging (MRI) scan: An MRI scan was performed to further characterize the lesion and confirm the CT scan findings. The MRI revealed a T1-hypointense, T2-hyperintense lesion in the right lower eyelid, consistent with the CT findings. Again, no bony erosion or orbital invasion was observed. Based on the clinical presentation, imaging findings, and the absence of other systemic abnormalities, a diagnosis of basal cell carcinoma (BCC) of the right lower eyelid, ulcerative type, was made. BCC is the most common type of skin cancer, and the periocular region is a frequent site of involvement. The ulcerative type of BCC is characterized by the presence of a central ulceration, as observed in this patient. Following the diagnosis of BCC, a surgical approach was deemed necessary to completely remove the cancerous lesion

and reconstruct the resulting lower eyelid defect. Given the size and location of the tumor, involving more than 50% of the lower eyelid margin, the modified Hughes procedure was selected as the reconstructive technique. This procedure involves harvesting a tarsoconjunctival flap from the upper eyelid and transposing it to the lower eyelid to recreate the posterior lamella. The anterior lamella would then be reconstructed using a suitable technique, such as a full-thickness skin graft or a local flap, depending on intraoperative findings and tissue availability. The patient underwent the surgical procedure under general anesthesia; Tumor Excision: Wide local excision of the BCC was performed, ensuring complete removal of the tumor with clear margins. Frozen section analysis was utilized intraoperatively to confirm complete tumor excision; Modified Hughes Procedure: A tarsoconjunctival flap was harvested from the upper eyelid, carefully preserving the marginal upper lid tarsus to maintain the structural integrity of the upper eyelid. The levator muscle aponeurosis was meticulously removed from the flap to prevent postoperative complications such as ptosis and entropion. The flap was then transposed to the lower eyelid and sutured in place to reconstruct the posterior lamella; Anterior Lamella Reconstruction: In this case, a full-thickness skin graft was chosen to reconstruct the anterior lamella. The graft was harvested from the preauricular region and carefully trimmed to fit the defect. It was then sutured to the surrounding skin edges, ensuring proper alignment and tension; Eyelid Closure: The eyelids were temporarily sutured together to protect the cornea and promote healing. Postoperatively, the patient was closely monitored for any complications. She received topical antibiotics and corticosteroids to prevent infection and reduce inflammation. Pain management was provided as needed. The patient was instructed to avoid rubbing or manipulating the surgical site and to maintain good eyelid hygiene. The patient was followed up regularly in the clinic to assess wound healing and functional outcomes. The sutures were removed after one week. The skin graft showed good integration and healing. The eyelid margin was well-aligned, and the lower eyelid function was satisfactory. The patient reported no significant discomfort or complications. Approximately 6-8 weeks after the initial surgery, the patient underwent a second procedure to release the tarsoconjunctival flap. This is a standard step in the modified Hughes procedure to restore full eyelid mobility and prevent complications such as lagophthalmos (inability to fully close the eyelids). The procedure was performed under local anesthesia and involved a simple incision to release the flap from its upper eyelid attachments. The patient continued to be followed up for several months after the second surgery. The eyelid remained stable, with good function and cosmesis. There was no evidence of tumor recurrence. The patient was satisfied with the surgical outcome and reported no significant functional or aesthetic concerns.

Case 2

A 56-year-old male presented to our ophthalmology clinic with concerns regarding an ulcer and a mole on his right lower eyelid. The patient reported that the ulcer had developed from one of two pre-existing moles approximately one year prior. He had a history of multiple basal cell carcinomas (BCCs) on his face and scalp, including lesions on the right side of his forehead, head, and nose, with three ulcers on the nose. A previous tumor excision on his nose had been diagnosed as nodular BCC through pathological examination. Clinical examination revealed an 8 mm ulcer with central hyperpigmentation and irregular borders on the right lower eyelid. Skin-colored papules were observed at the edge of the ulcer, potentially representing early nodular BCC lesions. Additionally, a 5 mm hyperpigmented papule was noted on the right lower eyelid, separate from the ulcer. The lateral and medial eyelid margins were intact, measuring 4 mm each, and the inferior lacrimal punctum was preserved. No palpable regional lymph nodes were detected. To evaluate the lesions and guide treatment planning, a series of diagnostic investigations were conducted; Complete blood count: Results were within

normal limits, indicating no systemic infection or hematological abnormalities; Blood chemistry: Blood chemistry analysis revealed no significant abnormalities, suggesting normal organ function and metabolic status; Coagulation profile: Normal coagulation parameters were essential to assess the patient's suitability for surgical intervention; Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP): Both inflammatory markers were within the normal range, ruling out significant systemic inflammation; Orbital computed tomography (CT) scan: A CT scan of the orbits revealed a well-defined, heterogeneously enhancing mass measuring 8 mm x 5 mm x 3 mm in the right lower eyelid. The mass involved the eyelid margin and extended into the adjacent subcutaneous tissues. Notably, there was no evidence of bony erosion or orbital invasion, suggesting localized disease; Magnetic resonance imaging (MRI) scan: An MRI scan was performed to further characterize the lesion and confirm the CT scan findings. The MRI demonstrated a T1-hypointense, T2-hyperintense lesion in the right lower eyelid, consistent with the CT findings. Again, no bony erosion or orbital invasion was observed. Based on the clinical presentation, imaging findings, and the patient's history of multiple BCCs, a diagnosis of basal cell carcinoma (BCC) of the right lower eyelid, nodular type, was made. The presence of skin-colored papules at the edge of the ulcer further supported this diagnosis, as these are characteristic of nodular BCC. Given the size and location of the tumor, involving more than 50% of the lower eyelid margin, surgical excision with subsequent reconstruction was deemed necessary. The modified Hughes procedure was selected as the reconstructive technique, as it allows for the reconstruction of large full-thickness lower eyelid defects while preserving the upper eyelid's structural integrity. The patient underwent the surgical procedure under general anesthesia; Tumor Excision: Wide local excision of the BCC was performed, encompassing the ulcer, the hyperpigmented papule, and a margin of healthy tissue to ensure complete tumor removal. Frozen section analysis was utilized intraoperatively to confirm clear margins; Modified Hughes Procedure: A tarsoconjunctival flap was harvested from the upper eyelid, meticulously preserving the marginal upper lid tarsus to maintain the structural integrity of the upper eyelid. The levator muscle aponeurosis was carefully removed from the flap to prevent postoperative complications such as ptosis and entropion. The flap was then transposed to the lower eyelid and sutured in place to reconstruct the posterior lamella; Anterior Lamella Reconstruction: In this case, an advancement flap from the lateral cheek was chosen to reconstruct the anterior lamella. This technique was preferred due to the patient's history of multiple facial BCCs, which limited the availability of suitable skin graft donor sites. The flap was carefully designed and mobilized to cover the defect, ensuring proper alignment and tension; Eyelid Closure: The eyelids were temporarily sutured together to protect the cornea and promote healing. Postoperatively, the patient was closely monitored for any complications. He received topical antibiotics and corticosteroids to prevent infection and reduce inflammation. Pain management was provided as needed. The patient was instructed to avoid rubbing or manipulating the surgical site and to maintain good eyelid hygiene. The patient was followed up regularly in the clinic to assess wound healing and functional outcomes. The sutures were removed after one week. The advancement flap showed good integration and healing, with no signs of necrosis or infection. The eyelid margin was well-aligned, and the lower eyelid function was satisfactory. The patient reported no significant discomfort or complications. Approximately 6-8 weeks after the initial surgery, the patient underwent a second procedure under local anesthesia to release the tarsoconjunctival flap. This involved a simple incision to release the flap from its upper eyelid attachments, restoring full eyelid mobility and preventing complications such as lagophthalmos. The patient continued to be followed up for several months after the second surgery. The eyelid remained stable, with good function and cosmesis. There was no evidence of

tumor recurrence. The patient was satisfied with the surgical outcome and reported no significant functional or aesthetic concerns.

Table 1. Anamnesis, clinical findings, laboratory, imaging, and diagnosis from case 1.

Anamnesis	Clinical finding	Laboratory	Imaging	Diagnosis
57-year-old female	Ulcer on the right lower eyelid for 1 year	Complete blood count: Within normal limits	Orbital computed tomography (CT) scan: A 1.5 cm x 1.0 cm x 0.5 cm well-defined, heterogeneously enhancing mass in the right lower eyelid, involving the eyelid margin and extending into the adjacent subcutaneous tissues. No evidence of bony erosion or orbital invasion.	Basal cell carcinoma (BCC) of the right lower eyelid, ulcerative type
Initially, a small, itchy bump on the right lower eyelid that was scratched, resulting in an ulcer	19 x 6 mm blackish ulcer on the inferior eyelid involving the margin, with a clear boundary, irregular edge, fixation, and ulceration	Blood chemistry: Within normal limits	Magnetic resonance imaging (MRI) scan: A 1.5 cm x 1.0 cm x 0.5 cm T1-hypointense, T2-hyperintense lesion in the right lower eyelid, involving the eyelid margin and extending into the adjacent subcutaneous tissues. No evidence of bony erosion or orbital invasion.	-
The ulcer had grown larger over the past 6 months	The lateral and medial margins remaining at 4 mm each, and the inferior lacrimal punctum intact	Coagulation profile: Within normal limits	-	-
No history of previous ocular surgery or trauma	No palpable regional lymph nodes	Erythrocyte sedimentation rate (ESR): Within normal limits	-	-
No significant medical history	No other ocular abnormalities	C-reactive protein (CRP): Within normal limits	-	-

Table 2. Anamnesis, clinical findings, laboratory, imaging, and diagnosis from case 2.

Anamnesis	Clinical finding	Laboratory	Imaging	Diagnosis
56-year-old male	Ulcer and mole on the right lower eyelid for 1 year	Complete blood count: Within normal limits	Orbital computed tomography (CT) scan: An 8 mm x 5 mm x 3 mm well-defined, heterogeneously enhancing mass in the right lower eyelid, involving the eyelid margin and extending into the adjacent subcutaneous tissues. No evidence of bony erosion or orbital invasion.	Basal cell carcinoma (BCC) of the right lower eyelid, nodular type
Initially, two moles on the right lower eyelid, and one of them turned into an ulcer	8 mm ulcer with central hyperpigmentation, irregular border, and skin-colored papules on the edge of the ulcer	Blood chemistry: Within normal limits	Magnetic resonance imaging (MRI) scan: An 8 mm x 5 mm x 3 mm T1-hypointense, T2-hyperintense lesion in the right lower eyelid, involving the eyelid margin and extending into the adjacent subcutaneous tissues. No evidence of bony erosion or orbital invasion.	-
Ulcers on the right side of the forehead, the right side of the head, and three ulcers on the nose	5 mm hyperpigmented papule on the right lower eyelid	Coagulation profile: Within normal limits	-	-
History of tumor excision on the nose with pathology report of nodular basal cell carcinoma	The lateral and medial margins remaining at 4 mm each, and the inferior lacrimal punctum intact	Erythrocyte sedimentation rate (ESR): Within normal limits	-	-
No history of previous ocular surgery or trauma	No palpable regional lymph nodes	C-reactive protein (CRP): Within normal limits	-	-
No significant medical history other than BCC	No other ocular abnormalities	-	-	-

The surgical approach for both cases followed a similar blueprint with key differences in the anterior lamella reconstruction. In both cases, the primary goal was complete tumor removal. A wide local excision with a 3 mm margin was performed, ensuring adequate clearance around the tumor to minimize the risk of recurrence. Intraoperative frozen section analysis was crucial in both cases to confirm complete excision and the absence of residual tumor cells at the margins. This real-time histological assessment allowed for immediate adjustments to the excision if necessary, ensuring the highest chance of complete tumor removal. Following tumor excision, the resulting lower eyelid defect size differed slightly between the two cases. In Case 1, the defect measured 22 x 8 mm, while in Case 2, it was slightly larger at 22

x 10 mm. Despite this difference, both cases had similar remaining lateral and medial eyelid margins of 4 mm each. Critically, the inferior lacrimal punctum, responsible for tear drainage, remained intact in both cases. Preserving the punctum is essential to prevent complications such as epiphora (excessive tearing). The core reconstructive technique employed in both cases was the modified Hughes procedure. This procedure is specifically designed for full-thickness lower eyelid defects exceeding 50% of the eyelid margin, making it suitable for both cases presented. The posterior lamella, comprising the tarsus and conjunctiva, forms the inner lining of the eyelid and provides structural support. To reconstruct this layer, a tarsoconjunctival flap was harvested from the upper eyelid in both cases. The flap was meticulously dissected, maintaining a distance of 3 mm from the upper eyelid margin to preserve the integrity of the upper eyelid and prevent complications such as notching or instability. The flap length was 22 mm in both cases, sufficient to cover the lower eyelid defect. Careful flap dissection and undermining were performed in both cases to ensure adequate mobilization of the flap without compromising its vascularity. This involved meticulous separation of the flap from the underlying orbicularis oculi muscle while preserving the delicate blood supply. The harvested tarsoconjunctival flap was then transposed to the lower eyelid and sutured to the remaining inferior tarsus using fine absorbable sutures. Precise suturing is critical to ensure accurate flap positioning and prevent complications such as eyelid malposition or ectropion (outward turning of the eyelid). The anterior lamella, consisting of the skin and orbicularis oculi muscle, forms the outer layer of the eyelid. The choice of anterior lamella reconstruction differed between the two cases, highlighting the adaptability of the modified Hughes procedure. In Case 1, a full-thickness skin graft (FTSG) was chosen to reconstruct the anterior lamella. The graft, measuring 25 x 8 mm, was harvested from the ipsilateral upper eyelid. This donor site was selected due to its excellent color and texture match with the lower eyelid skin. The FTSG was carefully positioned over the lower eyelid defect, ensuring proper anatomical alignment and minimizing tension. It was then secured to the remaining margin and tarsus using fine sutures. In Case 2, a myocutaneous advancement flap from the lateral cheek was utilized for anterior lamella reconstruction. This choice was made due to the patient's history of multiple facial BCCs, which limited the availability of suitable skin graft donor sites. A skin incision was made 2 mm from the lower edge of the inferior eyelid, extending towards the temporal region. The flap was carefully undermined and advanced to cover the defect, ensuring proper anatomical alignment and tension. The skin of the lower eyelid was sutured first, followed by suturing the skin flap to the tarsus. In both cases, a second surgical procedure was performed 6-8 weeks after the initial surgery to release the tarsoconjunctival flap. This is a standard step in the modified Hughes procedure to restore full eyelid mobility and prevent complications such as lagophthalmos. The procedure was performed under local anesthesia and involved a simple incision to release the flap from its upper eyelid attachments (Table 3).

Following the surgical procedures, both patients were closely monitored for complications and evaluated for functional and aesthetic outcomes. Table 4 summarizes the postoperative outcomes for both cases. In the immediate postoperative period, both patients demonstrated good tarsal flap apposition, indicating accurate placement and adherence of the tarsoconjunctival flap to the lower eyelid. The skin flap in Case 2 and the skin graft in Case 1 remained intact, with no signs of dehiscence or necrosis. All sutures were also intact, suggesting good wound closure and stability. Wound healing at the eyelid margin was excellent in both cases. This is a crucial outcome, as proper healing at the margin is essential for preventing complications such as eyelid malposition, ectropion, and entropion. The absence of wound healing complications can be attributed to the meticulous surgical technique, the preservation of the eyelid's vascular supply, and good postoperative care.

Remarkably, neither patient experienced any postoperative complications. This is a testament to the efficacy of the modified Hughes procedure and the careful surgical execution. Common complications associated with lower eyelid reconstruction, such as lagophthalmos (inability to fully close the eyelids), ectropion, entropion, trichiasis (inward turning of eyelashes), and corneal epithelial defects, were not observed in either case. Visual acuity remained excellent in both patients. Case 1 maintained 20/20 vision, while Case 2 had a slight reduction to 20/25. This minor difference is likely attributable to pre-existing visual conditions and not related to the surgical procedure. The preservation of visual acuity underscores the safety and effectiveness of the modified Hughes procedure in maintaining ocular function. Both patients retained full ocular motility, indicating that the surgical procedure did not compromise the extraocular muscles responsible for eye movement. This is a critical outcome, as restricted ocular motility can significantly impact quality of life and visual function. Both patients expressed high levels of satisfaction with the surgical outcomes. This subjective assessment is crucial, as it reflects the overall impact of the procedure on the patient's quality of life, including functional and aesthetic aspects. The high patient satisfaction can be attributed to the successful restoration of eyelid function and cosmesis, the absence of complications, and the overall positive surgical experience. Continued follow-up is essential to monitor for long-term complications and ensure the stability of the reconstructed eyelid. Both patients will be monitored for signs of recurrence, functional issues, and aesthetic concerns. Regular follow-up visits will also provide an opportunity to address any patient concerns and optimize long-term outcomes (Table 4).

Table 3. Surgical technique.

Surgical technique	Case 1	Case 2
Tumor excision	Wide excision with 3 mm margin	Wide excision with 3 mm margin
Defect size	22 x 8 mm	22 x 10 mm
Remaining margins	Lateral and medial margins 4 mm each	Lateral and medial margins 4 mm each
Inferior lacrimal punctum	Intact	Intact
Reconstruction technique	Modified Hughes procedure	Modified Hughes procedure
Posterior lamella reconstruction	Tarsoconjunctival flap harvested from the upper eyelid, 3 mm from the eyelid margin, with a length of 22 mm	Tarsoconjunctival flap harvested from the upper eyelid, 3 mm from the eyelid margin, with a length of 22 mm
Flap Dissection and Undermining	Performed	Performed
Flap suturing	Sutured to the remaining inferior tarsus	Sutured to the remaining inferior tarsus
Anterior lamella reconstruction	Full-thickness skin graft (FTSG) from the ipsilateral upper eyelid (Figure 1)	Myocutaneous advancement flap (Figure 2)
FTSG size	25 x 8 mm	Not applicable
FTSG positioning	Positioned over the lower eyelid defect as anatomically as possible	Not applicable
FTSG suturing	Hecting stitches to secure the graft to the remaining margin and tarsus	Not applicable
Advancement flap incision	Not applicable	Skin incision 2 mm from the lower edge of the inferior eyelid towards the temporal region
Advancement flap undermining	Not applicable	Performed
Advancement flap positioning	Not applicable	Positioned to cover the defect as anatomically as possible
Advancement flap suturing	Not applicable	Skin of the lower eyelid sutured, followed by suturing the skin flap to the tarsus
Tarsus flap release	Performed 6-8 weeks after the initial surgery	Performed 6-8 weeks after the initial surgery

Table 4. Postoperative outcomes.

Postoperative outcomes	Case 1	Case 2
Tarsal flap apposition	Good	Good
Skin flap/graft	Intact	Intact
Sutures	Intact	Intact
Wound healing at the eyelid margin	Good	Good
Complications	None	None
Visual acuity	20/20	20/25
Ocular motility	Full	Full
Lagophthalmos	None	None
Ectropion	None	None
Entropion	None	None
Trichiasis	None	None
Corneal epithelial defects	None	None
Patient satisfaction	High	High

Figure 1. Modified Hughes full-thickness skin graft.

Figure 2. Modified Hughes-advancement flap.

3. Discussion

The modified Hughes procedure stands as a cornerstone technique in the realm of oculoplastic surgery, specifically designed to address full-thickness defects of the lower eyelid. Its widespread adoption stems from its unique advantages over alternative reconstructive options, particularly when confronting defects encompassing more than 50% of the lower eyelid margin. A key advantage of the modified Hughes procedure lies in its meticulous preservation of critical upper eyelid structures. Unlike its traditional counterpart, the modified technique spares the marginal upper lid tarsus, a dense connective tissue plate that provides essential structural support and integrity to the upper eyelid. By leaving this structure intact, the modified Hughes procedure minimizes the risk of postoperative complications that can compromise the upper eyelid's functionality and aesthetics. One such complication is ptosis, characterized by drooping of the upper eyelid. The levator muscle, responsible for elevating the eyelid, attaches to the tarsus through a delicate aponeurosis. Disrupting the tarsus can destabilize this attachment, potentially leading to ptosis. The modified Hughes procedure, by preserving the tarsal integrity, mitigates this risk and ensures continued proper upper eyelid function. Another potential complication is entropion, a condition where the eyelid margin turns inward, causing the eyelashes to rub against the cornea. This can lead to significant discomfort, corneal irritation, and even vision-threatening complications. The tarsus plays a crucial role in maintaining the proper orientation of the eyelid margin. By preserving the tarsal structure, the modified Hughes procedure reduces the risk of postoperative entropion and safeguards the cornea's health. The modified Hughes procedure utilizes a tarsoconjunctival flap harvested from the upper eyelid as the foundation for lower eyelid reconstruction. This choice of donor tissue is based on the close similarity in tissue composition between the upper and lower eyelids. Both eyelids share a similar structure, consisting of an outer layer of skin, a middle layer of muscle, and an inner layer of tarsus and conjunctiva. This tissue compatibility is crucial in minimizing donor site morbidity, a key consideration in any surgical procedure. By harvesting tissue from a site with similar characteristics, the modified Hughes procedure promotes optimal integration and healing of the flap in the recipient site. This reduces the risk of complications such as graft failure, scarring, and functional deficits. Furthermore, the upper eyelid offers a readily accessible donor site with minimal morbidity. The surgical incision is carefully concealed within the natural crease of the upper eyelid, rendering the scar inconspicuous. The upper eyelid also has a rich vascular supply, ensuring adequate blood flow to the harvested flap and promoting rapid healing. The primary goals of lower eyelid reconstruction are to restore the eyelid's protective function, maintain corneal integrity, and achieve a satisfactory aesthetic appearance. The modified Hughes procedure excels in achieving these goals, allowing for the reconstruction of even large lower eyelid defects with minimal complications. The procedure effectively recreates the posterior lamella, the inner layer of the eyelid responsible for structural support and tear film maintenance. This restoration of the posterior lamella is crucial for preventing complications such as corneal exposure, dryness, and irritation. The choice of anterior lamella reconstruction technique, whether it be a full-thickness skin graft or an advancement flap, is tailored to the individual patient's needs and defect characteristics. This ensures optimal cosmetic outcomes, blending the reconstructed eyelid seamlessly with the surrounding tissues. The modified Hughes procedure's success in achieving good functional and cosmetic outcomes has been well-documented in the literature. Studies have consistently shown high patient satisfaction rates, minimal complication rates, and excellent long-term results. This underscores the procedure's value in the armamentarium of the oculoplastic surgeon.[11-13]

The anterior lamella, the outer layer of the eyelid, can be reconstructed using various techniques,

including full-thickness skin grafts (FTSG) or myocutaneous advancement flaps. The choice of technique depends on several factors, such as the size and location of the defect, the laxity of the surrounding skin, the availability of donor sites, and the surgeon's preference. In our case series, Case 1 underwent anterior lamella reconstruction using an FTSG harvested from the ipsilateral upper eyelid. This technique was chosen due to the excellent color and texture match between the upper and lower eyelids, ensuring a good cosmetic outcome. Additionally, the upper eyelid provides a readily available donor site with minimal morbidity. In Case 2, an advancement flap from the lateral cheek was utilized for anterior lamella reconstruction. This choice was made due to the patient's history of multiple facial BCCs, which limited the availability of suitable skin graft donor sites. Advancement flaps offer the advantage of using adjacent tissue with a good blood supply, promoting optimal healing and minimizing the risk of graft failure. The choice of anterior lamella reconstruction technique is a critical decision in lower eyelid reconstruction. The ideal technique should restore the eyelid's function and achieve a satisfactory cosmetic outcome while minimizing complications and donor site morbidity. The size and location of the defect play a crucial role in determining the appropriate technique. Smaller defects may be amenable to primary closure or local flaps, while larger defects may require skin grafts or more complex flaps. The laxity of the surrounding skin is another important consideration. If the surrounding skin is lax, an advancement flap or a rotational flap may be a good option. However, if the surrounding skin is tight, a skin graft may be necessary. The availability of suitable donor sites is crucial, especially when a skin graft is considered. The donor site should ideally match the color and texture of the recipient site to achieve a good cosmetic outcome. The surgeon's preference and experience also play a role in the decision-making process. Some surgeons may prefer certain techniques over others based on their training and experience. FTSGs are commonly used for anterior lamella reconstruction, especially when the surrounding skin is tight or when a good color and texture match is desired. FTSGs involve harvesting the entire thickness of the skin, including the epidermis and dermis, from a donor site and transplanting it to the recipient site. The upper eyelid is a common donor site for FTSGs in lower eyelid reconstruction. The upper eyelid skin is thin and pliable, making it a good match for the lower eyelid. Additionally, the upper eyelid has a rich vascular supply, which promotes graft survival. Myocutaneous advancement flaps involve mobilizing adjacent skin and muscle tissue to cover the defect. These flaps offer the advantage of using tissue with a good blood supply, which promotes optimal healing and minimizes the risk of graft failure. Advancement flaps are particularly useful when the surrounding skin is lax and when there is a need to maintain or improve eyelid function. The cheek is a common donor site for advancement flaps in lower eyelid reconstruction. Rotational flaps involve rotating adjacent skin and muscle tissue to cover the defect. These flaps are useful when the surrounding skin is lax and when there is a need to maintain or improve eyelid function. Free flaps involve harvesting tissue from a distant donor site and transplanting it to the recipient site. These flaps are typically used for complex defects or when local tissue is unavailable.[14-16]

The success of the modified Hughes procedure hinges on a meticulous surgical technique and unwavering attention to detail. Several key considerations are essential for achieving optimal outcomes and minimizing complications. The cornerstone of successful lower eyelid reconstruction is complete removal of the basal cell carcinoma (BCC) with clear margins. This is crucial to prevent tumor recurrence, which can compromise both functional and cosmetic outcomes. Achieving complete tumor excision requires careful planning and precise execution. The surgeon must carefully delineate the tumor's extent, considering its clinical appearance, imaging findings, and potential for subclinical extension. A wide local excision with a safety margin

of healthy tissue is typically performed to ensure complete tumor removal. Intraoperative frozen section analysis is a valuable tool in confirming complete excision. This technique involves sending excised tissue samples for immediate histological examination during the surgery. The pathologist can then assess the margins of the excised tissue for the presence of any residual tumor cells. If tumor cells are found at the margins, further resection can be performed until clear margins are achieved. The tarsoconjunctival flap, the foundation of the modified Hughes procedure, must be carefully harvested from the upper eyelid to ensure its viability and functionality. This involves meticulous dissection, preserving the marginal tarsus and avoiding damage to the levator muscle, which is responsible for elevating the upper eyelid. The surgeon must carefully plan the incision for flap harvesting, considering the size and location of the lower eyelid defect. The incision should be placed within the natural crease of the upper eyelid to minimize scar visibility. The dissection should proceed in a plane that preserves the vascular supply to the flap, ensuring its viability after transfer to the lower eyelid. The flap should be adequately mobilized to reach the lower eyelid defect without compromising its vascularity. Excessive tension on the flap can compromise blood flow, leading to flap necrosis and failure of the reconstruction. The surgeon must carefully balance the need for adequate flap mobilization with the preservation of its vascular integrity. An accurate flap inset is crucial for achieving optimal functional and cosmetic outcomes. The flap should be accurately positioned and sutured to the remaining lower eyelid tissue, ensuring proper alignment and tension. This prevents complications such as eyelid malposition, ectropion (outward turning of the eyelid), and entropion (inward turning of the eyelid). The surgeon must carefully align the flap with the remaining lower eyelid margin, ensuring that the eyelid margin is smooth and free of any notching or irregularities. The flap should be sutured with appropriate tension to avoid excessive tightness or laxity, which can lead to eyelid malposition. The choice of anterior lamella reconstruction technique should be individualized based on the patient's specific needs and the surgeon's preference. The graft or flap should be carefully positioned and sutured to achieve a good cosmetic outcome and maintain eyelid function. Full-thickness skin grafts (FTSGs) are commonly used for anterior lamella reconstruction, especially when the surrounding skin is tight or when a good color and texture match is desired. The surgeon must carefully select the donor site for the FTSG, considering factors such as skin color, texture, and thickness. The graft should be meticulously harvested and trimmed to fit the defect precisely. Advancement flaps are another option for anterior lamella reconstruction, particularly when the surrounding skin is lax and there is a need to maintain or improve eyelid function. The surgeon must carefully design and mobilize the flap to ensure adequate coverage of the defect without compromising its vascularity. The second stage of the modified Hughes procedure involves releasing the tarsoconjunctival flap from its upper eyelid attachments. This is typically performed 6-8 weeks after the initial surgery to restore full eyelid mobility and prevent complications such as lagophthalmos (inability to fully close the eyelids). The flap release is a relatively minor procedure performed under local anesthesia. The surgeon makes a small incision to release the flap from its upper eyelid attachments, allowing the eyelid to move freely. This restores full eyelid function and prevents complications associated with restricted eyelid mobility.[17-20]

4. Conclusion

In conclusion, the modified Hughes procedure is a valuable and effective technique for reconstructing full-thickness lower eyelid defects, particularly those exceeding 50% of the eyelid margin. This modified approach offers distinct advantages over the traditional Hughes procedure by preserving the structural integrity of the upper eyelid and minimizing the risk of complications such as ptosis and entropion. The procedure's success lies in its ability to restore both the anatomical and functional integrity of the

lower eyelid, providing optimal protection to the cornea and maintaining proper tear distribution. The choice of anterior lamella reconstruction technique, whether it be a full-thickness skin graft or an advancement flap, can be tailored to the individual patient's needs and defect characteristics, ensuring the best possible cosmetic and functional outcomes. The two cases presented in this study demonstrate the versatility and effectiveness of the modified Hughes procedure in achieving excellent surgical outcomes, with high patient satisfaction rates and minimal complications. It is important to note that the success of the modified Hughes procedure relies on meticulous surgical technique, careful patient selection, and thorough postoperative care. Surgeons considering this technique should be well-versed in the intricacies of lower eyelid anatomy and reconstruction principles. Further studies with larger patient populations and longer follow-up periods are warranted to further validate the long-term efficacy and safety of the modified Hughes procedure.

5. References

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