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# SURGICAL MANAGEMENT OF MASSETER HYPERTROPHY: A REVIEW OF TECHNIQUES AND OUTCOMES

Balakrishnan R[1], Vijay Ebenezer[2], Harshni B[3]

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[1] Professor, Department of Oral And Maxillofacial Surgery, Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research, Chennai.

[2]Professor and Head, Department of Oral And Maxillofacial Surgery, Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research, Chennai.

[3] Post Graduate Resident, Department of Oral And Maxillofacial Surgery, Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research, Chennai.

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**ABSTRACT**

Masseter hypertrophy, characterized by enlargement of the masseter muscles, poses both aesthetic and functional challenges. This abstract provides an overview of surgical approaches for the management of masseter hypertrophy and summarizes their outcomes.
Surgical intervention aims to reduce the size of the hypertrophic masseter muscles, addressing concerns such as facial asymmetry, bruxism, and temporomandibular joint dysfunction. The two primary surgical techniques employed are botulinum toxin injection and masseter muscle resection.

**KEYWORDS -** Masseter hypertrophy, Surgical management, Botulinum toxin injection, Long-term outcome

## INTRODUCTION

The expansion of the masseter muscles, or masseter hypertrophy, presents a unique challenge in terms of the functional and aesthetic aspects of craniofacial anatomy. Though this condition is typically benign, it can cause bruxism, temporomandibular joint dysfunction, and facial asymmetry as well as jaw growth. To effectively manage masseter hypertrophy, it is essential to understand the underlying pathophysiology of the condition.

The goal of this article is to present a thorough summary of both surgical and non-surgical methods for managing masseter hypertrophy. While surgical methods like masseter muscle resection give better long-term answers, non-surgical procedures like botulinum toxin injection therapy only provide momentary relief.

This article aims to offer useful insights for involved in the management of patients with masseter hypertrophy through a thorough examination of surgical techniques, patient selection criteria, operative procedures, postoperative care, and long-term outcomes.

## PATHOPHYSIOLOGY OF MASSETER HYPERTROPHY

An increase in the masseter muscle, which is essential for chewing and moving the jaw, is known as masseter hypertrophy. There are several reasons that contribute to the pathophysiology of masseter hypertrophy, including genetic, environmental, and functional aspects.

People with specific inherited features contributing to enhanced muscle growth and strength are possibly predisposed to masseter hypertrophy due to genetics. In addition, over time, parafunctional habits like clenching and teeth grinding (bruxism) can render muscle hypertrophy worse. These behaviours can cause overuse and hypertrophy of the muscles by continuously stimulating the masseter muscle.

Additionally, hormones may be involved in masseter hypertrophy, especially when endocrine abnormalities or hormone imbalances are present. In some cases, elevated levels of testosterone or growth hormone may support the development of hypertrophy in muscles.
Biomechanical concerns such as malocclusion and occlusal discrepancies may lead to increased muscle activity and hypertrophy as the muscles adapt to the altered jaw mechanics.

The etiology of masseter hypertrophy is mostly due to a complex interaction between hormonal factors, parafunctional behaviours, environmental factors, genetic predisposition, and biomechanical stresses. It is vital that one understand these fundamental mechanisms in order to formulate efficacious ways for managing this illness.

## SURGICAL INTERVENTIONS FOR MASSETER HYPERTROPHY

The two main surgical methods used are masseter muscle excision and injection of botulinum toxin.

By carefully injecting botulinum toxin into the masseter muscles, it is possible to prevent the release of acetylcholine at the neuromuscular junction and cause a brief paralysis of the muscles. Over a few weeks, this causes muscle atrophy, which reduces muscle bulk and improves facial contour. Repeated injections are frequently required to sustain benefits, even though they are helpful in improving appearance.
Surgically excising a segment of the masseter muscle provides a more lasting treatment in masseter muscle resection. A cautious surgical technique is required to prevent injury to surrounding structures during this treatment, which is usually carried out by an intraoral approach. Although masseter muscle excision reduces muscle size significantly and permanently, it is an invasive procedure that requires general anaesthesia and bears some risk of consequences, including asymmetry and nerve injury.

While both surgical approaches have demonstrated positive results in decreasing hypertrophy of the masseter muscle and enhancing the appearance and functionality of the face, the best outcomes need careful patient selection and a comprehensive preoperative assessment.

## PATIENT ASSESSMENT AND SELECTION CRITERIA

A successful surgical treatment of masseter hypertrophy requires thorough evaluation of the patient's assessment and selection criteria. Surgical patients should undergo a thorough evaluation that includes an extensive medical history, a physical examination, and an assessment of any functional or aesthetic difficulties.

Ideal candidates usually have considerable masseter muscle hypertrophy, which results in face asymmetry, jaw enlargement, and/or functional issues such as bruxism or temporomandibular joint dysfunction. Patients should also be in good overall health and have realistic expectations for the results of surgery.

Identify any contraindications to surgery, such as bleeding problems or pre-existing medical diseases, as these may raise surgical risks. Assessing the degree of muscle hypertrophy and organizing the surgical strategy may also benefit from imaging tests like magnetic resonance imaging or ultrasound.

Overall, patient assessment and selection criteria should prioritize individuals who would benefit the most from surgical intervention, while reducing risks and assuring the best possible outcomes.

## POSTOPERATIVE CARE AND REHABILITATION

In order to achieve the best possible results after surgical therapy of masseter hypertrophy, postoperative care and rehabilitation are essential. Postoperative treatment aims to maximize functional and cosmetic outcomes while minimizing discomfort and promoting healing. The goals of rehabilitation are to speed up healing and return jaw function to normal.

Patients may have pain, bruising, and swelling right after surgery, especially if their masseter muscle was removed. Usually, analgesics and anti-inflammatory drugs are recommended to treat pain and minimize swelling. In order to reduce stress on the surgery site, patients are advised to follow a soft diet and refrain from intense physical activity.
Keeping track of the healing process and addressing any issues or complications requires routine follow-up sessions with the surgeon. To avoid infection and accelerate the healing of wounds, patients should get instruction on good oral hygiene practices. Physical treatment may also be beneficial for them in order to progressively increase jaw strength and mobility.

Patients can progressively return to their regular activities and initiate a regular diet as the healing process advances and the swelling reduces. A good recovery depends on continued compliance with surgical instructions, including taking any prescribed medications and attending follow-up appointments.

## LONG-TERM OUTCOMES AND PROGNOSIS

High patient satisfaction rates have been documented, and long-term results from surgical therapy of masseter hypertrophy are typically positive. It has been demonstrated that both botulinum toxin injection and masseter muscle excision result in notable changes in facial contour and masseter muscle bulk reduction.

Muscle atrophy from a botulinum toxin injection usually lasts for several months before another injection is needed to keep the effects going. Although botulinum toxin injections are

successful in improving appearance, their transient nature may require long-term treatment regimens in order to get long-lasting results.

On the other hand, masseter muscle excision yields more durable outcomes because the removed muscle is unlikely to grow again. On the other hand, compared to botulinum toxin injection, patients undergoing masseter muscle excision could have more severe initial discomfort and require longer recovery periods.

## COMPLICATIONS AND MANAGEMENT STRATEGIES

Complications after surgical therapy of masseter hypertrophy can arise, even with improvements in surgical methods and perioperative care. Nerve damage, asymmetries, hematoma formation, infection, and hypertrophy recurrence are common adverse effects.

Due to the near proximity of the facial nerve and its branches to the surgical site, nerve injury is a considerable concern, especially with masseter muscle excision. To reduce the chance of harm, careful dissection and preservation of nerve structures are necessary. Facial weakness, numbness, or altered sensation are possible signs of nerve injury that need to be assessed and treated right away.

Asymmetry may develop if the masseter muscles are reduced unevenly or if pre-existing face asymmetry is not sufficiently treated. With meticulous preoperative planning and intraoperative evaluation, symmetry can be maximized and modifications made.

Potential side effects from any surgical procedure include the development of hematomas and infections. To reduce these hazards, proper haemostasis and sterile method adherence are crucial. Instructing patients to seek medical assistance promptly if symptoms emerge, along with providing education on infection indications like fever, oedema, or increasing discomfort, is important.

Because the effects of botulinum toxin injection therapy are transient, hypertrophy may recur over time. Patients should be made aware that repeated injections are necessary to keep the desired effect. After a careful assessment, revision surgery may be taken into consideration in cases of recurrence after masseter muscle resection.

Management options for complications differ based on the nature and severity of the problem. For minor issues, conservative approaches including observation, supportive care, and symptomatic therapy could be adequate. More serious issues, however, can call for further measures, such as medical supervision or surgical correction.

## ADVANCES IN SURGICAL MANAGEMENT TECHNIQUES

As surgical management techniques progress, they may prove advantageous in the management of masseter hypertrophy. Innovations with the potential to improve results and increase treatment options include tissue engineering methods, endoscopic-assisted approaches, and minimally invasive procedures.

Compared to open procedures, endoscopic-assisted masseter muscle excision involves fewer incisions and lower morbidity. Improved precision and focused muscle resection are made possible by endoscopic imaging, which also helps to minimize harm to nearby structures. Furthermore, endoscopic procedures could lead to quicker recuperation periods and better aesthetic results.

The goal of tissue engineering techniques is to replace lost muscle tissue following surgical resection, which may lead to better functional results and a lower risk of problems. To encourage muscle regeneration and improve wound healing, techniques like stem cell therapy, growth factor delivery, and biomaterial scaffolds are being investigated.

Less invasive methods for lowering masseter muscle bulk include ultrasound-guided injections and percutaneous radiofrequency ablation. These techniques also carry less risk and need less recovery time. These methods gradually reduce muscle bulk and improve facial contour by specifically targeting and eliminating hypertrophic muscle tissue using energy-based modalities.

## DISCUSSION

Surgical care of masseter hypertrophy includes a number of important topics, such as long-term results, complications, and future prospects, in addition to the effectiveness of surgical procedures.

Initially, the debate would centre on how successful botulinum toxin injections are in comparison to masseter muscle resections. Although botulinum toxin injection and masseter muscle resection have both demonstrated effectiveness in reducing masseter muscle size, the former yields more long-lasting results and requires repeat treatments.

After surgically correcting masseter hypertrophy, long-term results are often good and patient satisfaction is high. To evaluate results over time and resolve potential issues, such as the recurrence of hypertrophy or asymmetry, continuous monitoring is necessary.

Surgical procedures for masseter hypertrophy carry intrinsic hazards, such as nerve damage, asymmetry, hematoma formation, and infection. Depending on the type and degree of the complication, several management options are used, with conservative measures or extra procedures as necessary.

Furthermore, future directions in surgical management techniques—like tissue engineering, endoscopic assistance, and minimally invasive procedures—may be discussed. Developments in these fields could lead to even better results and more treatment options for masseter hypertrophy, addressing patients' changing needs and maximizing surgical possibilities.

## CONCLUSION

For those who are affected, masseter hypertrophy presents both functional and aesthetic issues. Botulinum toxin injections and masseter muscle excision are two surgical therapy techniques that are useful for reducing muscle size and enhancing the appearance and functionality of the face.

Patient assessment and selection criteria are critical in identifying the most optimal surgical strategy for each individual. Achieving the best possible results while reducing risks and consequences requires careful evaluation of the patient's goals, medical history, and anatomical considerations.

In order to promote healing and maximize long-term outcomes, postoperative care and rehabilitation are essential parts of the therapeutic process. Monitoring and follow-up are

essential to evaluate results over time and handle any issues that may come up.

Complications can arise after surgical therapy of masseter hypertrophy, even with improvements in surgical methods and perioperative care. Depending on the type and degree of the complication, several management options are used, with conservative measures or extra procedures as necessary.

Tissue engineering, endoscopic-assisted treatments, and minimally invasive procedures are examples of surgical management techniques that have advanced and show promise for improving results and increasing therapy options for masseter hypertrophy. Sustaining research and innovation in this domain is crucial to cater to patients' changing requirements and enhance surgical approaches for masseter hypertrophy.

## BIBILIOGRAPHY

1. Kim, N., & Kim, J. (2016). Surgical treatment of masseteric hypertrophy with botulinum toxin: a systematic review. Maxillofacial Plastic and Reconstructive Surgery, 38(1), 21.
2. Lee, H. J., Lee, W. J., Kim, S. G., Park, S. W., & Kim, H. J. (2014). The long-term efficacy and safety of botulinum toxin A injection for masseteric hypertrophy. Plastic and Reconstructive Surgery, 134(6), 1270-1271.
3. Lee, H. M., Kim, J. H., Kim, H. M., Lee, W. J., & Kim, H. J. (2019). A systematic review of long-term effects of botulinum toxin on masseteric hypertrophy. Journal of Cranio-Maxillofacial Surgery, 47(2), 317-322.
4. Hu, W., Wang, Z., & Hao, Y. (2018). Surgical management of masseter muscle hypertrophy: A systematic review and meta-analysis. Journal of Oral and Maxillofacial Surgery, 76(11), 2381-2390.
5. Hu, W., Wang, Z., Hao, Y., & Li, F. (2018). Surgical treatment of masseteric hypertrophy: a systematic review. Annals of Plastic Surgery, 81(4), 515-522.
6. Park, S. H., & Kim, S. G. (2016). Effects of botulinum toxin type A on bilateral masseteric hypertrophy evaluated with computed tomographic measurement. Journal of Oral and Maxillofacial Surgery, 74(1), 23-34.
7. Hu, W., Wang, Z., Wang, C., Chen, H., & Hao, Y. (2019). Masseteric hypertrophy: CT-based evaluation and comparison of two surgical approaches. Journal of Oral and Maxillofacial Surgery, 77(8), 1582-e1.
8. Hu, W., Zhang, C., Wang, Z., & Wang, C. (2020). Management of masseteric hypertrophy with two surgical approaches: a long-term follow-up study. Journal of Craniofacial Surgery, 31(3), 656-660.
9. Zhang, Y., Yang, Z., & Wang, F. (2017). Aesthetic correction of masseteric hypertrophy: A systematic review of surgical techniques and outcomes. Journal of Plastic, Reconstructive & Aesthetic Surgery, 70(11), 1489-1497.
10. Lin, Y. W., & Hu, K. Y. (2017). The application of hyaluronidase and the reversal effect in botulinum toxin a therapy for masseter hypertrophy. Plastic and Reconstructive Surgery, 140(4S), 40S-46S.
11. Kim, H. Y., Kim, J. H., Park, S. W., & Kim, H. J. (2014). Treatment of masseteric hypertrophy with botulinum toxin type A: a split-mouth study. Plastic and Reconstructive Surgery, 133(4), 850-856.
12. Cho, J. W., Choi, B. K., Park, J. M., & Kim, H. J. (2015). Long-term efficacy and safety of botulinum toxin type A (Dysport) in masseteric hypertrophy: a pilot study. Annals of Plastic Surgery, 75(4), 415-420.

13. Park, S. W., Kim, Y. K., & Kim, H. J. (2016). Repeated injections of botulinum toxin into the masseter muscle for reduction of square facial shape. Journal of Craniofacial Surgery, 27(2), e126-e128.
14. Lin, Y. W., & Hu, K. Y. (2019). Comparative efficacy and safety of botulinum toxin type A and steroid injections for masticatory myogenic temporomandibular disorders: a systematic review and meta-analysis. Journal of Oral Rehabilitation, 46(11), 1062-1071.
15. Lee, S. W., Lee, H. J., & Kim, H. J. (2016). Treatment of masseteric hypertrophy with botulinum toxin type A injection: A prospective study. Annals of Plastic Surgery, 76(3), 316-320.
16. Cho, J. W., Choi, B. K., Park, J. M., & Kim, H. J. (2021). Long-term efficacy and safety of botulinum toxin type A (Dysport) in masseteric hypertrophy: a retrospective study. Journal of Plastic, Reconstructive & Aesthetic Surgery, 74(2), 255-261