The Journal of Laryngology and Otology
February 1996, Vol. **110,** pp. 172–174

Metastatic masseter muscle tumour: a report of a case

HAJIME NAKAGAWA, M.D.*, YUKIKO MIZUKAMI, M.D.*, HIROSHI KIMURA, M.D.*, YUKIO WATANABE, M.D.*, NAOYA KUWAYAMA, M.D.†

Abstract
Both primary and metastatic malignancies of the masseter muscle are rare. We report a case of metastatic renal cell carcinoma to the masseter muscle. It was incidentally found as a hypervascular mass in carotid angiography for delineating a recurrent metastatic brain tumour. Prior to surgical removal, intravascular embolization via the left facial artery was performed in order to decrease intra-operative bleeding. The tumour was removed with minimum damage to the muscle fibres by the extraoral method, followed by a transient lower lip palsy. Metastatic intramuscular tumours, which are assumed to be due to haematogenous spread, are generally a sign of poor prognosis.

Key words: Carcinoma, renal cell; Neoplasm metastasis; Masseter muscle

Introduction

Benign or malignant tumours of the masseter muscle are extremely rare. Haemangiomas have been most frequently reported, followed by bilateral muscular hypertrophy, and malignancy is uncommon.

No metastasis from a renal cell carcinoma to the masseter muscle has been found in the literature so far, although renal cell carcinoma has a tendency for haematogenous spread, and more than one hundred cases with metastases to the head and neck have been reported (Inui *et al.*, 1992). This tumour was asymptomatic and found incidentally by angiography in a pre-operative survey for a metastatic brain tumour. The accepted optimal treatment was its total removal by the extra-oral approach in order to avoid facial nerve injury. The controversy surrounding operation methods is also presented.

Case report

A 57-year-old Japanese male was referred to our department for further evaluation of a hypervascular mass feeding from the left facial artery. He had a history of partial nephrectomy and total removal of a metastatic brain tumour from the left temporal lobe in 1989. The initial specimens from both the kidney and brain indicated renal clear cell carcinoma. Gamma-interferon along with vinblastin (VBL) were administered intravenously in the post-operative period. However, a follow-up CT scan revealed a high density mass, indicating a metastatic tumour in the left temporal lobe in October, 1993. Seldinger angiography showed both an intracranial and an extracranial hypervascular mass. The latter was assumed to have a feeder from the left facial artery (Figure 1). Intravascular embolization using a coil was performed.

On referral to the ENT department in November 16, 1993, he had no difficulty in mastication. No mass could be found on palpation of the masseter.

Magnetic resonance imaging (MRI) showed a high signal mass in T2 in the left masseter muscle (Figure 2). A

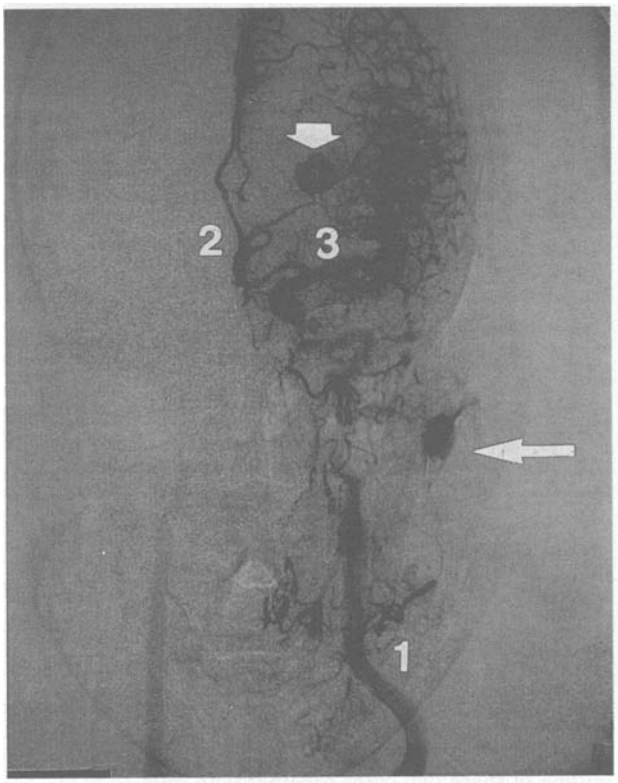

FIG. 1

Seldinger angiography. Angiography shows both extracranial arrow) and intracranial (arrowhead) hypervascular masses. The latter has a feeder from the left facial artery. 1: Carotid artery, 2: Middle cerebral artery 3: Anterior cerebral artery.

From the Departments of Otolaryngology*, and Neurosurgery†, Toyama Medical and Pharmaceutical University, Toyama, Japan.
Accepted for publication: 12 November 1995.

FIG. 2

MRI (*Coronal view*) MRI shows 15 mm × 10 mm high signal in the left masseter muscle on the T2-weighted image (arrow).

CT scan indicated a well-enhanced homogenous high density mass with a diameter of 10 mm (Figure 3), while a galium-citrate scintigram showed accumulation in the masseter muscle. Ultrasound examination failed to improve delineation of the tumour.

Under general anaesthesia, total removal was performed by the extraoral approach. An incision was made from the anterior portion of the tragus inferiorly, and turned anteriorly 2 cm below and parallel to the mandible. Great care was taken to avoid facial nerve injury in preparing the platysmal flap and the fascia of the masseter. A solitary mass was found in the masseter muscle with minimal adhesion to muscular fibres and conective tissue (Figure 4). It was removed en bloc with minimum damage to the muscle fibres and without sacrifice of the buccal branch of the facial nerve. The volume of bleeding was approximately 65 cm^3. The specimen showed the alveolar, and in some part, trabecullar proliferation of cancer cells with clear cytoplasm, which was consistent with the metastatic renal cell carcinoma (Figure 5). However atypism of the nucleus was not remarkable, indicating Grade I. The post-operative course was uneventful except for transient lower lip palsy for three weeks, and no trismus was noted. However, a coin lesion was found in the right lung field in plain chest X-ray and CT scan indicating a lung metastasis. The patient was treated with gamma-

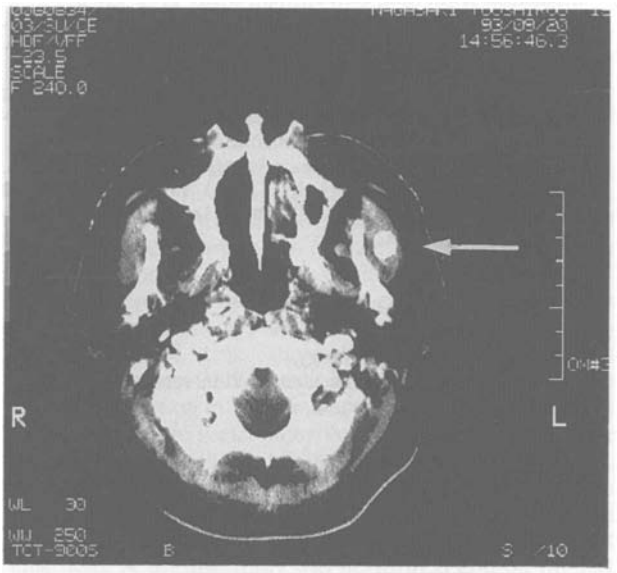

FIG. 3

CT scan (*axial view*) shows well enhanced mass in the left masseter muscle (arrow).

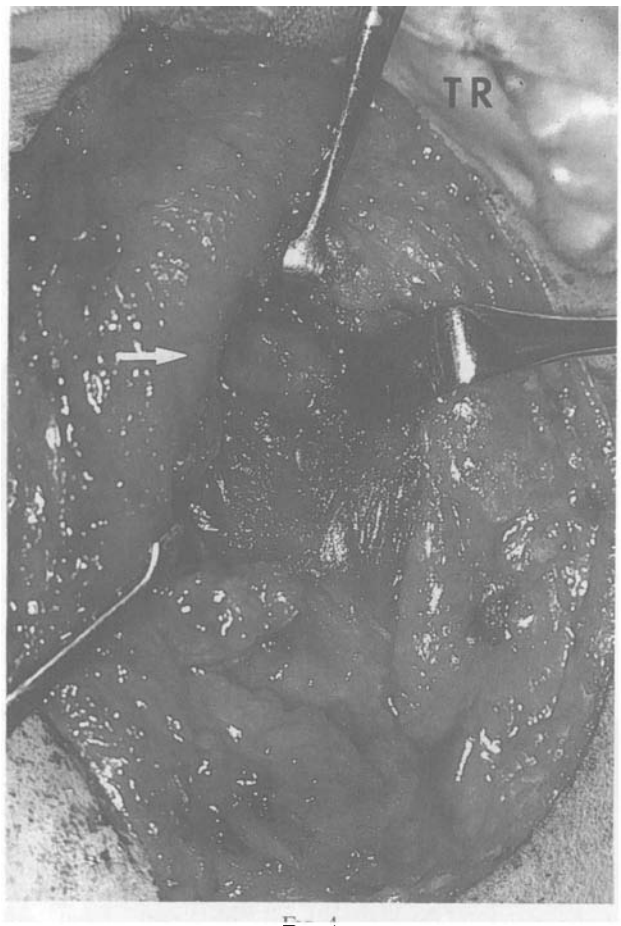

FIG. 4

Intra-operative findings. A skin incision was made from anterior portion of tragus inferiorly, turned anteriorly 2 cm below and parallel to mandible. The tumour (arrow) was found in masseter muscle with minimum adhesion to muscle fibres. (*TR; Tragus*)

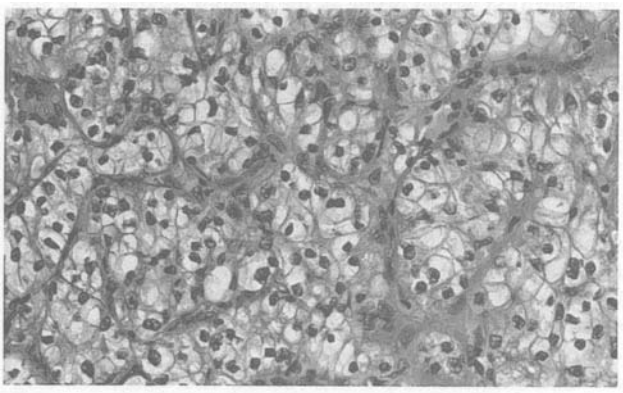

FIG. 5

Histopathological appearance of the extirpated specimen shows alveolar proliferation of the cancer cells with clear cytoplasm, which is compatible with metastasis of renal cell carcinoma. Atypism of the nucleus was not remarkable, indicating Grade I. (H & E stain, × 330)

https://doi.org/10.1017/S0022215100133080 Published online by Cambridge University Press

interferon, accordingly. He continues to live with disease, but shows no evidence of recurrence in the masseter muscle.

Discussion

The masseter muscle is a striated muscle, contributing to mastication. Striated muscle, in general, is a rare site either for primary or metastatic tumours. Sridhar (1987) *et al.* reviewed the reasons for the rarity of metastatic tumours in skeletal muscle reported in the literature. It could be related to blood flow, metabolism, or high tissue pressure. The blood flow of skeletal muscle is extremely variable, and connective tissues have been shown to possess diffusible protease and other inhibitors. Human carcinomas have been shown to clone, *in vitro*, better in hypoxic oxygen tension than in air. Therefore, skeletal muscle in which lactic acid metabolism is dominant may hinder tumour metastasis. A vascular flow in mastication is so variable as to prevent mechanical arrest of metastatic emboli.

Diseases involving the masseter muscles are rare. Haemangiomas have been most frequently reported so far followed by bilateral muscular hypertrophy. Konstantinos (1992) *et al.* reported metastatic breast carcinoma in the masseter.

Renal cell tumours have a tendency for haematogenous metastasis. Ramon (1990) *et al.* showed that the incidence of metastasis was 22 per cent in Stage I, 50 per cent in Stage II, 67 per cent in Stage III, respectively. Skinner (1971) *et al.* reported that metastatic lesions were found most frequently in the lungs, followed by bones, the retroperitoneum, the brain and the thyroid, which was similar to that by McNichols (1981) *et al.* Inui (1992) *et al.* reviewed 119 metastatic head and neck renal cell carcinoma, and cited that the most frequently involved organ were the nasal and paranasal cavities (53 per cent), followed by the larynx (15 per cent), and the mesopharynx and the tongue (13 per cent). However, masseter muscle metastasis has not been reported so far. Two pathways for haematogenous spread might be considered; one is transarterial delivery from the inferior caval vein via the heart, through the carotid artery, and to the affected organ; the other is transvenous delivery from the inferior caval vein via the superior caval vein, vertebral, palatine, spongial venous plexus to the affected organ.

A metastatic intramuscular tumour by itself, assumed to be haematogenic, is a sign for poor prognosis. In our case, surgery was determined to be the best choice, as malnutrition would occur as the tumour increased in size, resulting in trismus. Also interferon and vinblastine have been unsatisfactory in some metastatic cases. Fossa (1992) *et al.* reported that the response rate was 24 per cent for patients who received interferon and vinblastine, and that the five year survival rate was nine per cent.

It is controversial whether the intraoral or extraoral approach should be performed. The former has the disadvantages of a narrower operative view, difficulty in identification of the facial nerve, damage of Stenon's duct, and possible infection by oral bacteria. The latter may leave a scar. Konstantinos chose the intraoral method. The extraoral approach was performed in patients with rhabdomyosarcoma (Chemello *et al.*, 1988). In our case, the extraoral method was preferable. Because the tumour could not be palpated, it was necesary to avoid facial nerve injury and to remove the tumour en bloc. The buccal, mandibular, and masseter branches of the facial nerve could be preserved with ease, while post-operative scarring resulting in trismus could be ignored. From these considerations, the extraoral approach should be chosen in case of malignancy.

Renal cell carcinoma shows hypervascularity in both the primary and metastatic sites in angiographic studies. The improvement in the surgical conditions postembolization was reported in nasopharyngeal angiofibroma by Waldman *et al.* (1981), and in paragangliomas of the head and neck by Anton *et al.* (1986). Pre-operative embolization can also be used in cases where metastasis from renal cell carcinoma is suspected after identification of the feeding artery.

References

Chemello, P. D., Nelson, C. L., Tomich, C. E., Sadove, M. (1988) Embryonal rhabdomyosarcoma arising in the masseter muscle as a second malignant neoplasm. *Journal of Oral and Maxillofacial Surgery* **46:** 899–905.

Fossa, S. D., Marteinelli, G., Otto, U., Schneider, G., Wander, H., Oberling, F., Bauer, H. W., Achtnichit, U., Holdener, E. E. (1992) Recombinant interferon alfa-2a with or without vinblastine in metastatic renal cell carcinoma: Result of an European multicentre phase III study. *Annals of Otology* **3:** 301–305.

Inui, H., Kikuoka, K., Fujita, N., Tanako, O., Miyahara, Y., Matsunaga, T. (1992) Metastatic renal cell carcinoma in the maxillary sinus. *Practica Otologica* **85:** 69–75 (in Japanese).

Kostantinos, T., Antonios, V., Adamandios, A. (1992) Metastatic breast carcinoma of the masseter: Case Report. *Journal of Oral and Maxillofacial Surgery* **50:** 304–306.

McNichols, D. W., Segura, J. W., DeWeerd, J. H. (1981) Renal cell carcinoma: Long-term survival and late recurrence. *Journal of Urology* **26:** 17–23.

Ramon, J., Goldwasser, B., Raviv, G., Jonas, P., Many, M. (1990) Long-term result of simple and radical nephrectomy for renal cell carcinoma. *Cancer* **67:** 2506–2511.

Skinner, D. G., Colvin, R. B., Vermillion, C. D., Pfister, R. C., Leadbetter, W. F. (1971) Diagnosis and management of renal cell carcinoma. A clinical and pathologic study of 309 cases. *Cancer* **28:** 1165–1177.

Sridhar, K., Rao, R., Kunhardt, B. (1987) Skeletal muscle metastasis from lung cancer. *Cancer* **59:** 1530–1534.

Ramon, J., Goldwasser, B., Raviv, G., Jonas, P., Many, M. (1990) Long-term result of simple and radical nephrectomy for renal cell carcinoma. *Cell* **67:** 2506–2511.

Valavanis, A. (1986) Pre-operative embolization of the head and neck: indications, patient selection, goals, and precautions. *American Journal of Neuroradiology* **7:** 943–952.

Waldman, S. R., Levine, H. L., Astor, F., Benjamin, G.W., Weinstein, M., Tucker, H. M. (1981) Surgical experience with nasopharyngeal angiofibroma. *Archives of Otolaryngology* **107:** 677–682.

Address for correspondence:
Hajime Nakagawa, M.D.,
Department of Otolaryngology,
Toyama Medical and Pharmaceutical University,
2630 Sugitani, 930-01 Toyama, Japan.

Fax: +81-764-34-5038