Mohs micrographic surgery at the Skin and Cancer Foundation Australia, 10 years later (1997 vs 2007)

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Background: Mohs micrographic surgery (MMS) provides a combination of high cure rate and tissue conservation. Epidemiologic factors and changes in techniques may affect the way MMS is performed.

Objective: We sought to evaluate changes over time in the type of patients and skin cancers that are treated using MMS, and the repairs used to close the defects.

Methods: We conducted a retrospective study on patients treated with MMS at the Skin and Cancer Foundation Australia, Westmead, in 1997 against those treated in 2007. Patient demographics (age, sex), pathology of tumor, anatomic site of the tumor, preoperative tumor size, postoperative defect size, and repair method were analyzed.

Results: There was a 260% increase in the number of procedures (596 in 1997 vs 1587 in 2007). The 2007 cohort was a little older (62 vs 64 years), but there were no differences in sex, anatomic site, rate of basal/squamous cell carcinoma, squamous cell carcinoma histologic subtypes, or preoperative tumor size. However, there were fewer superficial basal cell carcinomas, and the postoperative defect size was smaller in 2007 ($P < .0001$). There was also a decrease in the use of grafts and second-intention healing to close the defects and an increase in the number of side-to-side closures ($P < .0001$).

Limitations: Retrospective study at one institution is a limitation.

Conclusion: Although tumor size and the percentage of tumors in each anatomic site did not change over 10 years, the size of the defect created after MMS has become smaller. This reduction in defect size may explain why more defects are now repaired by side-to-side closure and flap repairs whereas fewer defects are repaired by skin grafting. (J Am Acad Dermatol 2010;63:832-5.)

Key words: Mohs micrographic surgery; nonmelanoma skin cancer.

The incidence of nonmelanoma skin cancer (NMSC) is increasing rapidly. In white populations in Europe, the United States, Canada, and Australia, the average annual increase of NMSC has been 3% to 8% per year since the 1960s.[1] The increasing incidence rates of NMSC are probably a result of a combination of increased sun exposure or exposure to ultraviolet light, increased outdoor activities, changes in clothing style, increased longevity, and ozone depletion.[2] As the incidence of NMSC increases, so does the number of modalities used to treat this condition. Although excisional surgery is the most frequently used approach, other options include electrodesiccation and curettage, cryosurgery, and other newer noninvasive options including topical chemotherapeutics, biological-

Abbreviations used:

BCC:	basal cell carcinoma
MMS:	Mohs micrographic surgery
NMSC:	nonmelanoma skin cancer
SCC:	squamous cell carcinoma
SCFA:	Skin and Cancer Foundation Australia

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immune-response modifiers, retinoids, and photodynamic therapy, which can be used in superficial tumors.[3] Although radiation therapy is effective, its use is limited to certain patients who are not surgical candidates. Mohs micrographic surgery (MMS) remains as the gold standard that provides good control of complete peripheral and deep margins without sacrificing inappropriate amounts of normal tissue, while yielding high cure rates and maximum tissue conservation; hence it is widely used for locally aggressive NMSC.

The Australian MMS database was initiated by the Skin and Cancer Foundation Australia (SCFA) in 1993 with the aim of collecting data prospectively. It is the largest reported prospective nationwide series of patients with NMSC treated by MMS and involves all surgeons in the country. Leibovitch et al[4-6] reported data monitored by SCFA over 10 years on basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) treated with MMS, and the outcome at 5-year follow-up for BCC.

In the evolution of the MMS, a number of improvements have been made, including its move to the fresh tissue technique[7] in the 1970s, and immediate repairs rather than leaving the tumor to heal by secondary intention, that have lead to better outcomes. In recent years, the application of immunostaining techniques has facilitated the successful removal of cutaneous malignancies. There has been a recent review[8] on the current uses of immunostaining in MMS and the authors concluded that immunohistochemical technique has played an important role in MMS advancement.[8]

This article compares all patients treated with MMS at SCFA, Westmead in 1997 against those treated in 2007 at the same institution with the objective of evaluating changes in the type of patients, type of skin cancer, and repair used to close the defects after surgery.

CAPSULE SUMMARY

- There was a 260% increase in the number of Mohs micrographic surgery procedures from 1997 to 2007.
- Although tumor size and other variables did not change over 10 years, the size of the defect became smaller.
- This reduction in defect size explains why more defects are now repaired by side-to-side closure.
- There is a shortage of Mohs surgeons in Australia.

METHODS

We conducted a retrospective study on all patients treated with MMS at the SCFA, Westmead in 1997 and those treated in 2007. Parameters studied were patient demographics (age, sex), pathology of tumor, anatomic site of the tumor, preoperative tumor size, postoperative defect size, and repair method used for reconstruction.

The data were analyzed using statistical software (JMP, Version 7.0.2., SAS Institute Inc, Cary, NC). The *t* test, χ^2, and contingency analysis were used as the main statistical instruments. *P* values less than .05 were considered significant.

RESULTS

A total of 596 patients in 1997 and 1587 patients in 2007 were treated with MMS at the SCFA. This is a 260% increase in the number of procedures. The 2007 cohort was significantly older (61.7 ± 14 vs 63.8 ± 14 years; $P < .0001$) with no difference in sex distribution (329 [53.6%] male in 1997 and 790 [49.8%] male in 2007; $P = .11$).

Nearly all the tumors were located on the head and neck (98.20% in 1997 and 98.11% in 2007), most commonly on the nose (39.38% in 1997 and 41.36% in 2007). In summary, there was no difference in the anatomic site of the tumors between the two cohorts (Table I) ($P = .06$).

BCC was the most common skin cancer treated with MMS (93.81 in 1997 and 91.3% in 2007) with SCC (5.7% in 1997 and 7.6% in 2007) and other skin tumors (0.5% in 1997 and 0.95% in 2007) being less frequent. There was no statistically significant difference in tumor type between the two cohorts (Table II).

Regarding BCC subtypes, there was a significant increase ($P < .001$) in the micronodular variant (3.04% in 1997 to 8.83% in 2007) and a reduction in the superficial variant (16.49% in 1997 to 4.83% in 2007) (Table II).

The most common histologic subtypes of SCC in our study were the well differentiated in both years (50% in 1997 and 40.43% in 2007). Although there was an increase in the number of poorly differentiated subtype (0 in 1997 and 10.64% in 2007), overall, there was no statistical difference in the histologic subtypes of SCC treated with MMS between 1997 and 2007 ($P = .29$).

The preoperative tumor size revealed no difference between the two studied years ($P = .38$) (Table III). However, the postoperative defect size was smaller in 2007 as compared with 1997 ($P < .001$) (Table III).

Regarding the type of closure used to repair the defect (Table IV), there was a significant ($P < .001$) decrease in the use of grafts (36.7% in 1997 to 15.7%