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Long-term outcomes of surgical treatment for dermatofibrosarcoma protuberans according to width of gross resection margin



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KEYWORDS

Surgical treatment;
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Gross resection margin;
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Frozen biopsy

Summary *Background:* Controversy exists regarding appropriate surgical treatment for dermatofibrosarcoma protuberans (DFSP). The purpose of this study was to propose treatment recommendations based on long-term outcomes of surgical treatments for DFSP.

Methods: A total of 63 patients who underwent surgical resection for primary DFSP were retrospectively reviewed from 1999 to 2011. They were classified into three groups based on the width of the gross resection margins: group I with marginal excision (14 patients); group II with resection margins < 3 cm (21 patients); and group III with resection margins ≥ 3 cm (28 patients) (group II and group III had wide local excision).

Results: The median follow-up period was 65 months (range 31–190 months). The marginal excision group showed a significantly higher recurrence rate than the wide excision group (35.7% vs. 0%, $p < 0.001$). Among wide excision groups, group III showed a significantly higher requirement for reconstructive surgery than group II (82.7% vs. 52.4%, $p = 0.011$), yet both groups had no recurrence and pathologic margin status was comparable. The accuracy rate of frozen section analyses was 100% for the margin status in the wide excision group. Adjuvant radiation was significantly associated with a reduced recurrence in the marginal excision group (0% vs. 60%, $p = 0.016$).

Conclusions: Wide local excision with margins of 1.5–2 cm along with frozen biopsy is recommended for DFSP. Either re-excision or adjuvant radiation therapy can serve as a treatment option for patients with positive margins.

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Introduction

Dermatofibrosarcoma protuberans (DFSP) is a rare painless tumor of the skin with an incidence of 0.8–5 cases per 1 million people annually.¹ Approximately 85–90% of all DFSPs are low-grade lesions, and the remaining small proportion is associated with a high-grade fibrosarcomatous component.² Immunohistochemical staining for CD34 is often used for differential diagnosis, because it is positive for DFSP, but negative for dermatofibroma.

Taylor et al. first described the histological characteristics of DFSP as spindle-shaped tumor cells invading local tissue by direct extension.³ Local recurrence is frequent after surgical excision, because microscopic tumor margins usually extend beyond the gross margins. Despite frequent local recurrence, DFSP rarely metastasizes unless it undergoes fibrosarcomatous change.⁴ The probability of regional or distant metastasis is <5% and is frequently preceded by multiple local recurrences. Because recurrence is closely related to adequate surgical margins, obtaining a negative margin through surgical excision is the primary goal of DFSP treatment.^{5,6} In this regard, wide local excision with margins of at least 3–4 cm has long been recommended as the standard treatment for DFSP.^{1,7–9} However, recent studies have demonstrated that a good local control could be achieved with narrow resection margins.^{10–12} The authors have clinically experienced that margins ≥ 3 cm in wide local excision often necessitated reconstructive surgery, because even a 1-cm-sized tumor caused a defect of >7 cm. Therefore, it can be of special concern to reconstructive surgeons whether wide excision with gross resection margins of at least 3 cm improved treatment outcomes.

Controversy also exists on the role of radiation therapy as an adjuvant therapy. While several single-institution series have reported good local control after adjuvant radiotherapy, these were limited by heterogeneous surgical modalities, which made the direct comparison impossible.^{13–16} Although frozen sections play a vital role in the evaluation of margins of basal and squamous cell carcinomas, the role of frozen sections in evaluation of soft-tissue tumors is controversial.¹⁷

The purpose of this study was to propose treatment recommendations based on the long-term outcomes of surgical treatments in 63 DFSP patients and a literature review. Treatment outcomes were reviewed focusing on the effect of surgical margins on local recurrence, role of adjuvant radiation therapy, and intraoperative frozen section assessment.

Material and methods

Data collection

The institutional review board of authorized institution approved this retrospective study (study number: 2014-09-137). A total of 65 cases were retrospectively reviewed in 63 patients with DFSP who underwent surgical resection from 1999 to 2011 (one patient underwent resection thrice because of recurrences). Patients with primary tumor (except the two cases of recurrent surgery in one patient)

who were diagnosed with DFSP by pathologic analysis were also included in this study. Sex, age, tumor location, tumor size, width of gross resection margin, intraoperative frozen biopsy, pathologic analysis, adjuvant radiotherapy, follow-up period, and recurrence were analyzed. Patients with a follow-up period of <2 years were not included in this study because of the risk of late recurrence.¹ Patients were classified into three groups based on the width of the gross resection margin. Group I consisted of patients with marginal excision of the tumor. Patients who received wide local excision were further divided by the width of the gross resection margin into group II and group III (group II: resection margin <3 cm; group III: resection margin ≥ 3 cm). The gross resection margin was defined as the closest gross margin as measured by the surgeon at the time of resection.

Surgical treatment

Wide local excision was the mainstay of surgical treatment for the patients in this study. The width of the gross resection margin was determined by the surgeon based on tumor location and surgeon's experience and preferences. The incision line was marked on the normal skin to obtain the planned distance from the tumor margin. Dissection proceeded vertically through subcutaneous tissue until the investing fascia (deep fascia) was exposed. The investing fascia was resected together with the tumor. The specimen was sent to a pathological laboratory for intraoperative frozen section assessment. Four lateral margins (12, 3, 6, and 9 O'clock) and one deep margin were evaluated. Further resection was performed if a positive margin was reported. Primary closure or reconstructive surgery was performed once a negative resection margin was confirmed by frozen biopsy. Frozen biopsy was not undertaken in some cases based on the surgeon's clinical decision or when frozen section analysis was not available. CD34 staining was performed to distinguish DFSP from other soft-tissue tumors. Except for the width of the peripheral resection margin, patients in groups II and III received the same surgical treatment.

Group I patients underwent marginal excision that did not include normal skin or soft tissue in the resected specimen. Marginal excision was planned based on cosmetic or functional concerns or when the excision was for the diagnostic confirmation of the tumor. The patients consulted with a radiation oncologist about adjuvant radiation. Some patients preferred only follow-up to radiation therapy. The dose of radiation was 200 cGy per fraction, 30 fractioned, with a total dose of 60 Gy.

Statistical analysis

Statistical analysis was performed using SAS version 9.3 (SAS Institute Inc, Cary, NC, USA). The primary outcomes were recurrence and the rate at which patients needed reconstructive surgery at the time of the excision. Probable confounding factors, such as tumor size, follow-up, and tumor location (rate of head and neck tumor), were also analyzed to identify between-group differences. Fisher's exact test and the Kruskal–Wallis test were used to obtain

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