

Case of pleomorphic dermal sarcoma with systematic review of disease characteristics, outcomes and management

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DESCRIPTION

A 79-year-old man presented with a 6-month history of four new painless enlarging scalp lesions. He had a strong history of sun exposure but otherwise no previous skin cancers. On examination, the lesions were suspicious for squamous cell carcinoma including a raised anterior scalp lesion measuring 4×7 mm with an overlying crust (figure 1). The lesions were removed by standard margin excisions down to the periosteum and the areas reconstructed with split skin grafts.

Histological analyses revealed the anterior scalp lesion to be a pleomorphic dermal sarcoma (PDS). The other lesions were confirmed to be low risk squamous cell carcinoma and actinic keratosis. All lesions had clear margins (>1 mm) except for the PDS, which had a close deep margin of 0.3 mm and demonstrated focal invasion to the galea, whereas peripheral margins were clear by around 4 mm. Sections of the PDS showed a poorly circumscribed tumour, arising in sun-damaged skin, which expanded the dermis and infiltrated into and through the subcutis (figure 2). Tumour cells were variably epithelioid and spindled, with focal cytological atypia, including prominent nucleoli. Occasional multinucleated forms were observed and atypical mitoses were present. There was no evidence of tumour necrosis, nor lymphovascular or perineural invasion. Immunostaining was negative for MNF116, AE1/AE3, CK5/6, p63, desmin, S100, SOX10, CD34 and CD31. The immunohistochemical panel excluded other possible differential diagnoses, including squamous cell carcinoma, melanoma and angiosarcoma.

The patient was reviewed in a skin multidisciplinary team discussion and surgical re-excision was recommended for the PDS close deep margin, which he is currently awaiting.

PDS is characteristically a fast-growing, ulcerated, exophytic, bleeding skin tumour, similar to atypical fibroxanthomas, but with metastatic potential and is histologically distinguished by

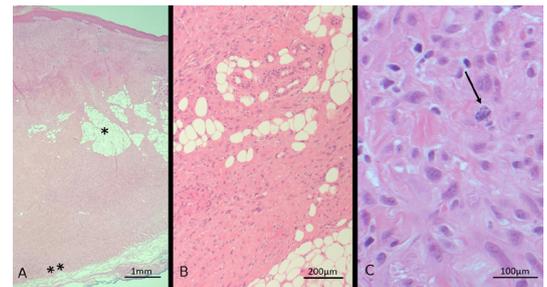


Figure 2 Histological features (H&E) of the excised pleomorphic dermal sarcoma. (A) The tumour extends from the dermis, through the subcutaneous fat plane*, to focally invade galea aponeurotica**. (B) Tumour cells infiltrate among adipocytes in the subcutaneous fat. (C) Tumour cells exhibit pleomorphic, enlarged and irregular nuclei, with prominent nucleoli. Mitotic activity was identified (arrow), including occasional atypical mitotic figures.

necrosis, or deep subcutis, lymphovascular or perineural invasion.^{1,2} Little is known about the best clinical treatment due to its rarity. Hence, a systematic search in PubMed of ‘pleomorphic dermal sarcoma’ was conducted in April 2021, netting 134 articles, from which 15 were longitudinal studies that provided outcomes specific to PDS (table 1).^{2–16} Reported characteristics and outcomes (besides age) were pooled via random-effects meta-analysis using the generalised linear mixed model with logit transformation, along with Clopper-Pearson CIs for individual studies.¹⁷ Heterogeneity was assessed via the I² statistic and the likelihood-ratio test.¹⁸ Statistical tests were conducted using the meta package in R (V.3.6.0).^{19,20}

In six studies,^{2,3,8,10,12,14} PDS primarily affects older individuals (weighted mean age=80.64), and from meta-analysis, predominantly occurs in men (82.80%, 95% CI=72.37% to 89.95%, I²=62.1%, likelihood-ratio test p=0.011). Meta-analyses further showed that PDS is largely found on the scalp (68.92%, 95% CI=57.99% to 78.08%, I²=54.9%, p=0.019) in five studies,^{2,3,8,12,14} or the face (13.05%, 95% CI=4.16% to 34.18%, I²=88.1%, p<0.0001) in six studies.^{2,3,8,10,12,14} Recurrence rate was 23.80% (95% CI=17.97% to 30.82%, I²=11.5%, p=0.037) in eight studies,^{2–4,8–10,12,14} with 19.92% (95% CI=15.43% to 25.32%, I²=0%, p=0.050) local recurrence and 7.14% (95% CI=4.55% to 11.05%, I²=0%,



Figure 1 Pleomorphic dermal sarcoma on the anterior scalp (A, right arrow) and close up (B, right arrow).



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Table 1 Studies included in systematic review

Study (country)	n (male)	Mean size	Mean follow-up	Mean age	Location	Local recurrence	Metastases	Risk of bias*
Bowe <i>et al</i> ³ (UK)	49 (45)	23.5 mm (median)	22.4 months	80 (median)	32 scalp 5 forehead 3 ear 3 cheek 2 nose 2 lower leg 1 temple 1 lower lip	6/41 (6 clear margins) 7/41	1/41 (1 death)	Moderate
Cesinaro <i>et al</i> ⁴ (Italy)	7	–	13 months	–	–	3/7 3/7	0/7 (0 deaths)	Low
Helbig <i>et al</i> ⁵ † (Germany)	25 (19)	–	–	78	3 head/neck 2 shoulder	0 deaths from 1 MiTF-expressing PDS case with follow-up		High
Jasper <i>et al</i> ⁶ (Canada)	20	–	–	–	–	6/20	2/20	Moderate
Klein <i>et al</i> ⁷ † (Germany)	28 (23)	–	–	80 (median)	26 head/neck 2 shoulder	5/28		Moderate
Lonie <i>et al</i> ² (Australia)	27 (23)	–	46.4 months	79.27	17 scalp 7 face 2 ear 1 torso	2/26 (1 positive, 1 close margin) 3/27	1/27 (1 death)	Low
Miller <i>et al</i> ⁸ (UK)	32 (27)	25 mm	24 months (median)	81	22 scalp 4 forehead 2 ear 2 temple 1 eyebrow 1 forearm	8/29 (7 incomplete removal) 8/29	3/29 (0 deaths)	Moderate
Miller <i>et al</i> ⁹ (USA)	17	–	–	–	–	2/2 2/2	0/2	High
Müller <i>et al</i> ¹⁰ (Germany)	19 (15)	6.75 cm ²	–	81.16	16 head 2 face 1 upper extremity	2/19 2/19	0/19	High
Nonaka and Bishop ¹¹ (Japan)	34	–	>2 years	–	–	1/34 death (positive margin, metastasis)		Moderate
Persa <i>et al</i> ¹² (Europe)	92 (80)	20 mm	18 months	81 (median)	76 scalp 9 trunk 7 extremities	18/92 26/92	8/92	Low
Ríos-Viñuela <i>et al</i> ¹³ ‡ (Spain)	16 (14)	25.63 mm (n=15)	25.88 months	80.43	10 scalp 1 forehead 2 nose 2 ear 1 temple	12/16 (8 positive margins) 12/16	3/16 (2 deaths)	Low
Tardío <i>et al</i> ¹⁴ (Spain)	18 (9)	22 mm	40 months	81	9 scalp 5 forehead 1 nose 1 eyebrow 1 cheek 1 temple	3/15 (3 positive margins) 5/15	3/15 (3 deaths)	Moderate
Thum <i>et al</i> ¹⁵ § (UK)	3 (3)	31.67 mm	3 months	79	2 scalp 1 temple	0 recurrences or deaths from 2 pseudovascular PDS cases with follow-up		Moderate
Wang <i>et al</i> ¹⁶ ¶ (USA)	6 (6)	11 mm	48.6 months	61	3 scalp 2 temple 1 ear	4 recurrences and 4 deaths from 6 metastatic PDS cases		Low
Total	331 (199/237 male)	21.47 mm	13–46.4 months	80.64	156/218 scalp 33/237 face	50/251 56/232	18/252 (6/174 deaths)	5 low 7 moderate 3 high

*Rated using the modified Newcastle-Ottawa Scale for case series from Haffar *et al*.²¹

†Results not pooled with others due to overlap with cohort from Persa *et al*.¹²

‡Results not pooled with others as study cohort was primarily composed of recurrent PDS referred from other institutions.

§Results not pooled with others as study examines a subset cohort from Miller *et al*⁸ of pseudovascular PDS.

¶Results not pooled with others as study examined metastatic PDS only.

MiTF, Microphthalmia-associated transcription factor; PDS, pleomorphic dermal sarcoma.

0.261) metastasis over nine studies (mean follow-up 13–46.4 months).^{2–4 6 8–10 12 14} Among four studies,^{2 3 8 14} 87.25% (95% CI=3.11% to 99.93%, I²=91.0%, p=0.0003) of local recurrences were due to incomplete removal or inadequate margins. There is limited evidence showing radiotherapy is

effective.^{2 6 12} There is also limited evidence showing modified Mohs micrographic surgery offers better prognosis than conventional surgery.¹³ Conversely, margins <2 cm predispose worse prognosis.¹² Two metastatic cases were successfully managed by chemotherapy.^{2 8}

Learning points

- ▶ Pleomorphic dermal sarcoma is a rare cancer that presents primarily in older men on sun-exposed areas such as the scalp.
- ▶ Due to the metastatic potential of pleomorphic dermal sarcoma, it is important not to miss this diagnosis and to ensure complete resection of the tumour.

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