Erosive pustular dermatosis of the scalp following surgical procedures: a systematic review

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Abstract

Erosive pustular dermatosis of the scalp (EPDS) occurs in elderly individuals with significant actinic damage. EPDS also occurs in association with surgery; however, significant studies determining an association of EPDS with type of surgical closure is absent. This review examines whether the closure method following cutaneous surgery performed on the scalp is associated with development of EPDS. Databases were reviewed and studies describing EPDS after cutaneous surgery met inclusion criteria. Articles were excluded if EPDS developed after trauma or non-surgical procedures. Descriptive analyses were performed on the data. Thirteen case reports and 6 case series involving 32 patients met inclusion criteria. Fourteen articles (73.7%) stated that EPDS developed in the same location as, or near to, the closure site. Thirteen patients (40.6%) developed EPDS following skin grafting. Three patients (9.4%) developed EPDS following secondary intention healing, two patients (6.3%) following repair by primary intention, and one patient (3.1%) following repair with a local skin flap. Thirteen cases (40.6%) did not specify closure type. This review revealed that surgical procedures performed on the scalp utilizing skin grafts for closure may be increasingly associated with the development of EPDS compared to other closure types.

Keywords: erosive pustular dermatosis of the scalp, cutaneous surgery, EPDS

Introduction

Erosive pustular dermatosis of the scalp (EPDS) is an uncommon, but likely underreported, condition predominately occurring in elderly individuals with significant actinic damage [1, 2]. Triggering factors include physical and topical therapies (e.g. cryotherapy or imiquimod), surgery, malignancy, and local trauma including mild cuts or bruises [2]. Previous studies have reported EPDS arising after various surgical procedures. However, none have focused on the association between EPDS and specific closure types. As such, this systematic review examines whether the closure method following cutaneous surgery performed on the scalp is associated with the development of EPDS

We searched the Embase, Ovid Medline, PubMed Medline, Scopus, and Web of Science databases from inception to October 5th, 2018 (**Table 1**). This review followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [3]. Studies were included if they described EPDS occurring after cutaneous surgery performed on the scalp. Articles were excluded if EPDS developed after trauma or non-surgical procedures. Age, gender, diagnosis of EPDS, type of cutaneous surgery, closure type (primary intention, secondary intention, local skin flap, skin graft), time to development of EPDS, prior treatment, treatment of EPDS, outcome of treatment, and follow-up were extracted from each study. Descriptive analyses were performed using Microsoft Excel (2016).

Discussion

Thirteen case reports and 6 case series involving a total of 32 patients met inclusion criteria (**Table 2**). Fourteen articles (73.7%) stated that EPDS developed in the same location as, or near to, the closure site (**Table 3**). The majority of cases (68.8%) were diagnosed by clinicopathologic correlation. Three cases (9.4%) presented EPDS as a clinical diagnosis and seven cases (21.9%) did not specify how EPDS was diagnosed. The mean age of patients was 69.7 years (range 15-91) and approximately half were male. Thirteen patients (40.6%) developed EPDS following skin grafting (5 split thickness, one full thickness, 7 unspecified), with a median time to development of 10 months. The mean age of patients developing EPDS after skin grafting was 75.8 years (range 50-91 years). Additionally, three patients (9.4%) developed EPDS following secondary intention healing, two patients (6.3%) following repair by primary intention, and one patient (3.1%) following repair with a local skin flap. Thirteen cases (40.6%) did not specify a closure type. Treatments for EPDS were varied and most commonly included high-potency topical corticosteroids (75.0%) followed by topical tacrolimus (18.8%). Two articles described cases of EPDS in which excision and skin grafting were used as treatments and neither article noted recurrence of the EPDS. Overall, 83% of EPDS cases resolved after therapy.

The majority (40.6%) of EPDS cases presenting after cutaneous surgery performed on the scalp occurred in older patients after skin grafting with a median time to development of 10 months. The underlying mechanism linking skin grafting and EPDS is unclear. It has been previously proposed that local trauma from skin grafting mimics a Koebner-like phenomenon [8]. Another proposed mechanism is the production of local inflammatory cytokines following skin grafting, which could heighten the wound healing response and drive the development of exuberant pustular dermatosis.

Conclusion

This systematic review reveals that surgical procedures performed on the scalp utilizing skin grafts for closure may be increasingly associated with the development of EPDS compared to other closure types. Limitations of this study include the predominance of case reports as well as the lack of closure type specified in 40% of cases. As the number of articles describing EPDS following specific closure types is small, additional larger retrospective and prospective studies are warranted to characterize the link between EPDS and specific closure methods, and investigate strategies for improved primary prevention.

Potential conflicts of interest

The authors declare no conflicts of interests.

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Table 1. *Supplementary Table: MeSH Search Terms.*

Database	Type of Search	Search Terms
Embase (http://www.elsevier.com/online-tools/embase)	Combination of these search terms.	'erosive pustular dermatosis of the scalp'/exp OR 'erosive pustular dermatosis of the scalp', 'erosive pustular dermatosis', 'skin surgery'/exp OR 'skin surgery', 'surgery:ti,ab', 'surgical:ti,ab', 'postoperative complication'/exp', 'complication*:ti,ab', 'postoperative:ti,ab', 'transplantation'/exp', 'transplant*:ti,ab', 'graft*:ti,ab', ''tissue flap'/exp', 'flap:ti,ab', 'wound closure'/exp', 'closure:ti,ab', 'secondary intention healing'/exp', 'secondary NEAR/2 intention', 'wound healing'/exp', 'granulation tissue'/exp', 'granulation'/exp', 'granulation'/exp', 'granulation:ti,ab', ''healing'/exp', 'healing:ti,ab'
Ovid Medline (http://ovid.com/site/catalog/databases/)	Limited to English language	"Erosive Pustular Dermatosis.tw." "exp Dermatologic Surgical Procedures/" "exp General Surgery/"" surgery.tw." "surgical.tw." "exp POSTOPERATIVE COMPLICATIONS/" "postoperative.tw." "complication*.tw." "exp Transplants/" "transplant*.tw." "graft*.tw." "exp PERFORATOR FLAP/" "flap.tw." "exp WOUND CLOSURE TECHNIQUES/" "closure.tw." "secondary intention.tw." "exp Wound Healing/" "exp GRANULATION TISSUE/" "granulation.tw." "healing.tw."
PubMed Medline (http://www.ncbi.nlm.nih.gov/pubmed)		Search ((((((((((((((((((((Dermatologic Surgical Procedures[MeSH Terms]) OR General Surgery[MeSH Terms]) OR surgery[Text Word]) OR surgical[Text Word]) OR POSTOPERATIVE COMPLICATIONS[MeSH Terms]) OR postoperative[Text Word]) OR complication*[Text Word]) OR Transplants[MeSH Terms]) OR transplant*[Text Word]) OR graft*[Text Word]) OR PERFORATOR FLAP[MeSH Terms]) OR flap[Text Word]) OR WOUND CLOSURE TECHNIQUES[MeSH Terms]) OR closure[Text Word]) OR secondary intention[Text Word]) OR Wound Healing[MeSH Terms]) OR GRANULATION TISSUE[MeSH Terms]) OR granulation[Text Word]) OR healing[Text Word]))) AND Erosive Pustular Dermatosis[Text Word] Filters: English
Scopus (http://www.scopus.com/)	MeSH	TITLE-ABS-KEY (erosive AND pustular AND dermatosis) AND TITLE-ABS-KEY (surger* OR surgical OR postoperative OR complication* OR trans plant* OR graft* OR flap* OR closure OR "secondary intention" OR healing OR granulation) AND (LIMIT-TO (LANGUAGE , "English"))
Web of Science (https://login.webofknowledge.com)		(TS=(Erosive Pustular Dermatosis) AND TS=(surger* or surgical or postoperative or complication* or transplant* or graft* or flap* or closure or secondary NEAR/2 intention or healing or granulation)) *AND* **LANGUAGE:** (English) *AND* **DOCUMENT TYPES:** (Article) *Indexes=SCI-EXPANDED Timespan=1900-2018*

Table 2. *Cohort demographics and clinical characteristics of studies included in systematic review.*

Article	Study type	Number of patients	Prior surgical scalp procedure	Closure method
Thuraisingam et al. 2018 [2]	Case series	2	a. MMS b. ED&C	a. NS b. Secondary intention
Wilk et al. 2017 [4]	Case series	4	a. WLE b. WLE c. WLE d. WLE	a. Skin graft b. Skin graft c. NS d. Skin graft
Gensheimer 2017 [5]	Case report	1	WLE	Skin graft
Hiroyasu et al. 2012 [6]	Case report	1	Corrective surgery for ossification of posterior longitudinal ligament	NS
Uva et al. 2016 [7]	Case report	1	WLE followed by MMS	Skin graft
Roche-Kubler et al. 2015 [8]	Case report	1	WLE	Skin graft
Shahmoradi et al. 2014 [9]	Case report	1	Hair transplantation	NS
Jankowski et al. 2014 [10]	Case report	1	Corrective surgery for cranial trauma	NS
Stockinger et al. 2014 [11]	Case series	4	Surgical treatment NS	NS
Roodbergen et al. 2012 [12]	Case series	1	WLE	Skin graft
Tardio et al. 2011 [13]	Case report	1	MMS	Skin graft
Lavigne et al. 2011 [14]	Case report	1	MMS	NS
Marzano et al. 2009 [15]	Case report	1	Cochlear implant surgery	Primary intention
Patton et al. 2007 [16]	Case series	6	a. ED&C b. ED&C c. WLE d. WLE f. WLE	a. Secondary intention b. Secondary intention c. NS d. Primary intention f. NS
Mehmi et al. 2004 [17]	Case report	1	WLE	Skin graft
Martin et al, 2001 [18]	Case report	1	WLE	Skin graft
Ena et al. 1997 [19]	Case series	2	a. WLE b. WLE	a. Skin graft b. Skin graft
Layton et al. *Br J Dermatol*. 1995 [20]	Case report	1	Right frontal craniotomy	Local skin flap
Ikeda et al. 1982 [21]	Case report	1	WLE	Skin graft

Abbreviations: NMSC, non-melanoma skin cancer; AK, actinic keratosis; NS, not specified; MMS, Mohs micrographic surgery; ED&C, electrodessication and curettage; WLE, wide local excision.

Table 3. *Characteristics of erosive pustular dermatosis of the scalp (EPDS) patients stratified by type of closure.*

Closure method	Sex	Age	Prior scalp surgical procedure	Time to EPDS	Treatment	Response to treatment
Skin grafting (n=13)	M	84	WLE	NS	THPS, TAC, sodium bituminosulfonate	Resolved
	F	49	WLE	8.5 years	THPS, TAC, sodium bituminosulfonate	R/P
	F	83	WLE	NS	THPS, TAC, sodium bituminosulfonate	R/P
	M	82	WLE	6 years	THPS	Resolved
	M	88	WLE	3 months	2nd graft; then THPS, zinc gluconate	Resolved
	M	73	WLE	NS	Topical silver nitrate	Resolved
	F	76	MMS x2	NS	THPS, TAC	Resolved
	M	91	WLE	NS	THPS, neomycin sulphate, nystatin	Resolved
	F	50	WLE	1 year	TA, PO antibiotics, THPS	NS
	M	60	WLE	8 months	PO isotretinoin	R/P
	M	72	WLE	3 months	gentamycin-betamethasone cream	Resolved
	M	87	WLE x2	6 months	Debridement, silicone gel	Resolved
	F	91	WLE	1 year	PO zinc sulphate	Resolved
Secondary intention (n=3)	F	79	ED&C	NS	THPS	Resolved
	F	79	ED&C	NS	THPS	Resolved
	M	86	ED&C	NS	THPS	NS
Primary Intention (n=2)	F	24	Cochlear implant surgery	Few days	THPS, TAC	Resolved
	M	15	WLE	NS	THPS	Resolved
Skin flap (n=1)	F	53	Right frontal craniotomy	6 weeks	Salicylic acid, THPS, neomycin, nystatin, PO antibiotic	R/P
Other/NS (n=13)	F	87	MMS	NS	THPS	NS
	M	73	WLE	NS	THPS, TAC, sodium bituminosulfonate	R/P
	F	75	Corrective surgery for ossification of posterior longitudinal ligament	NS	Oral prednisolone	Resolved
	M	35	Hair transplantation	9 months	THPS + zinc sulphate PO	Resolved
	M	49	Corrective surgery following cranial trauma	2 weeks	THPS	Resolved
	M	NS	Surgical treatment NS	NS	5% dapsone-gel, THPS	Resolved
	M	NS	Surgical treatment NS	NS	5% dapsone-gel, THPS	Resolved
	M	NS	Surgical treatment NS	NS	5% dapsone-gel, THPS	Resolved
	M	NS	Surgical treatment NS	NS	Excision and split-skin grafting	Resolved
	F	80	WLE	NS	THPS	Resolved
	M	73	WLE	NS	THPS	Resolved
	F	75	Corrective surgery for ossification of posterior longitudinal ligament	NS	Oral prednisolone	Resolved
	F	83	MMS	NS	Vinegar soaks, hydrocolloid dressing, enzymatic debriding agent	Resolved

Abbreviations: WLE, wide local excision; NS, not specified; R/P, recurrence/progression; MMS, Mohs micrographic surgery; ED&C, electrodessication and curettage; tac, tacrolimus topical; PO, oral; Tx, treatment, THPS, topical high potency steroid; M, male; F, female; NMSC, nonmelanoma skin cancer.