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Bold to do — bald to be? Outcomes decades after harvesting the scalp in burned children

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ABSTRACT

Background: The scalp is the only hidden donor site for split thickness skin grafts. Nevertheless, it is underappreciated due to fear of iatrogenic scarring alopecia. Long-term data showing whether androgenetic hair loss can reveal previously hidden scarring alopecia is unavailable. We aimed to evaluate results and patient satisfaction up to 30 years after skin harvest from the scalp.

Methods: Burn patients, hospitalized between 1977 and 1987 at the University Children's Hospital Zurich with scalp skin harvest and currently over 30 years old, were studied. Medical records and patient satisfaction were analyzed, and a clinical scalp examination was performed.

Results: Thirty-two patients (18 males, 14 females) with a current age of 34.13 ± 3.42 years participated. Mean follow-up time was 27.09 ± 3.04 years. Fifty-four scalp harvests were performed with 1.69 ± 0.96 sequential harvests. Hair growth was considered normal in 97% patients. Androgenetic alopecia (AGA) type Norwood II–VI was seen in 11 patients. Scalp examination revealed 11 unknown likely harvest-related alopecias with a mean size of 0.7 cm^2 .

Conclusions: Long-term morbidity of scalp skin harvest and the risk of clinically significant alopecia is very low while patient satisfaction is high. AGA is unlikely to reveal harvest damage previously hidden by regrown hair.

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1. Introduction

The standard technique to cover full and deep partial thickness burn wounds is split thickness skin grafting (STSG). Grafts are typically harvested from the thigh and the back. The scalp has been first mentioned as a donor site in 1964 [1]. Since then, it has been described by numerous authors as an ideal donor site for the following reasons: low complication rate, easy handling during and after harvest, rapid healing and therefore eligibility for multiple re-harvesting [2,3] with an interval as short as 8–10 days following the first harvest [3–8]. Rapid re-epithelialization is believed to be due to high vascular supply and particularly the numerous epithelial skin appendages of the scalp [4–15]. Moreover, regrowth of hair may conceal smaller potentially harvest-related scars, changes in texture or pigmentation. Therefore, the scalp is also being cited as the only hidden donor site available [13]. Furthermore, in younger children, the head is proportionally much larger than in adults [9,14], thus making the scalp particularly yielding.

Astonishingly, the scalp is still not harvested in numerous centers, most likely due to the technically more challenging procedure (curved donor area) and the fear of potentially disastrous complications, such as acute or chronic folliculitis and alopecia [5–7,9,11,16]. However, several studies have shown that the risk of infection is low and clearly related to meticulous hygiene and proper management of the donor area [14]. Scarring alopecia may be a consequence of technical errors during harvest or subsequent infections. Rates of alopecia mentioned in the current literature vary between 0.7 and 32% [3,5,6,9,16–22], however follow-up time in those publications reached a maximum of 10 years [6,7,15].

In order to detect harvest related long term sequelae, but also to document physiological changes of scalp skin and hair growth due to aging, we examined patients with previous STSG harvested from their scalp for acute burn treatment up to 31 years ago. Long-term clinical findings as well as patient satisfaction were recorded.

2. Patients and methods

In a retrospective study conducted in 2009, hospital records of inpatients of the Pediatric Burn Center of the University

Children's Hospital Zurich between August 1977 (foundation of the Pediatric Burn Center) and July 1987 were searched to match the following inclusion criteria: ≤ 16 years of age, hospitalization due to a thermal injury, at least one skin harvest from the scalp during acute burn injury treatment, and current age of 30 years or older. Identified patients were contacted and informed written consent was obtained for the examinations planned.

2.1. Surgical procedure

The surgical procedure of harvesting STSG from the scalp was implemented by Pochon, the first Director of the Pediatric Burn Center in the late 1970s and does not differ much from today's routine procedure [16]. Under general anesthesia, the hairline was marked to ensure correct harvesting strictly within the hair-bearing zone, the scalp was shaved completely, washed with soap and water, and an antiseptic agent was applied. The surgical field was draped and a subgaleal injection of physiological saline solution was performed to create a slightly fluctuating flat area for harvest. In more recent years, epinephrine, local anesthetics, and sodium bicarbonate were added (tumescence solution). The STSG was then harvested with an electrical dermatome in a preset depth of 0.15–0.3 mm (Fig. 1). The donor site was then covered with a single layer of gauze and temporarily with epinephrine soaked wet gauzes. The single layer gauze was removed carefully at day 10–13 after harvest following overnight moisturizing with petroleum jelly. When re-harvesting was necessary, complete re-epithelialization was awaited and the surgical procedure was repeated as described.

2.2. Chart review

Sex, age at the accident, mechanism of accident (scald, flame, others), percentage of total body surface area (TBSA) burned, number and area of skin harvests from the scalp, donor site complications, length of hospital stay, and follow-up were extracted from the participant's medical records.

2.3. Patient interviews

Study participants were asked the following questions during a standardized interview:



Fig. 1 – Technique of split thickness skin harvesting from the scalp in children. Following injection of tumescence solution, the skin is harvested using an electrical dermatome.

1. Do you remember the burn accident?
2. Does your former burn injury have any impact on your everyday life?
3. Have you ever noticed any discomfort (e.g. hypo- or hypersensitivity, itch) or change on your scalp since being discharged from the hospital for your acute burn treatment?
4. Would you consider your hair growth to be comparable to that of your parents or siblings?

2.4. Scalp examination and photographic documentation

All patients underwent a systematic clinical scalp examination by a physician. The Fitzpatrick Scale was used to determine the skin type. Scalp hair was sequentially parted in order to examine every square centimeter. Attention was given to hair growth (hair density, thickness, growth pattern e.g. AGA), bald areas, abnormal pigmentation, and changes in skin texture. Potential AGA was evaluated using the Norwood classification for men (Fig. 2) and the Ludwig scale for females [23,24]. Non androgenetic alopecia was defined as any hairless and scarred area that was identified without vision magnification and then categorized according to its location in correlation to the burn injury and the documented harvesting area on the scalp as (1) alopecia within the burned area of the scalp, (2) alopecia within the non-burned area of the scalp, and (3) unclassifiable. Category three was used for areas of alopecia with insufficient documentation to assign them to categories one or two. Identified areas were measured with a ruler in two dimensions and classified as spotty for areas of $\leq 1\text{cm}^2$, small

for $1\text{--}5\text{cm}^2$, medium sized for $5\text{--}10\text{cm}^2$, and large for areas $>10\text{cm}^2$. Standardized photographs were taken from five different angles plus close-ups of relevant scalp findings (Figs. 3 and 4).

3. Results

3.1. Patient characteristics

Within the 10-year study period, 71 former patients of the Pediatric Burn Center Zurich matched above inclusion criteria. We were able to contact 58, while 13 were lost to follow-up. A total of 32 individuals (18 males, 14 females; 56%) gave informed consent to participate in the study.

Detailed patient characteristics are shown in Table 1. Mean age at the time of burn incident was 7.03 ± 4.54 years (1–15 years). Mean current age was 34.13 ± 3.42 years (31–45 years). 31 were European Caucasians and one was a Hispanic male. Main mechanism of injury was scald ($n=17$), followed by flame ($n=13$), and electrical injury ($n=1$). Mean percentage of TBSA burned was $25.59 \pm 3.42\%$ (6–60%). 54 scalp harvests were performed in 32 patients with a mean of 1.69 ± 0.96 (1–5) sequential harvests per patient. 35 times the entire scalp was harvested while nine times the scalp was only harvested partially, in three patients due to a burn injury to the scalp itself. In 10 patients the precise zone of harvest was not documented. Chart review did not reveal any documented donor site complications neither during the immediate postoperative period nor during routine follow-up. Mean follow-up time was 27.09 ± 3.04 years (13–31 years).

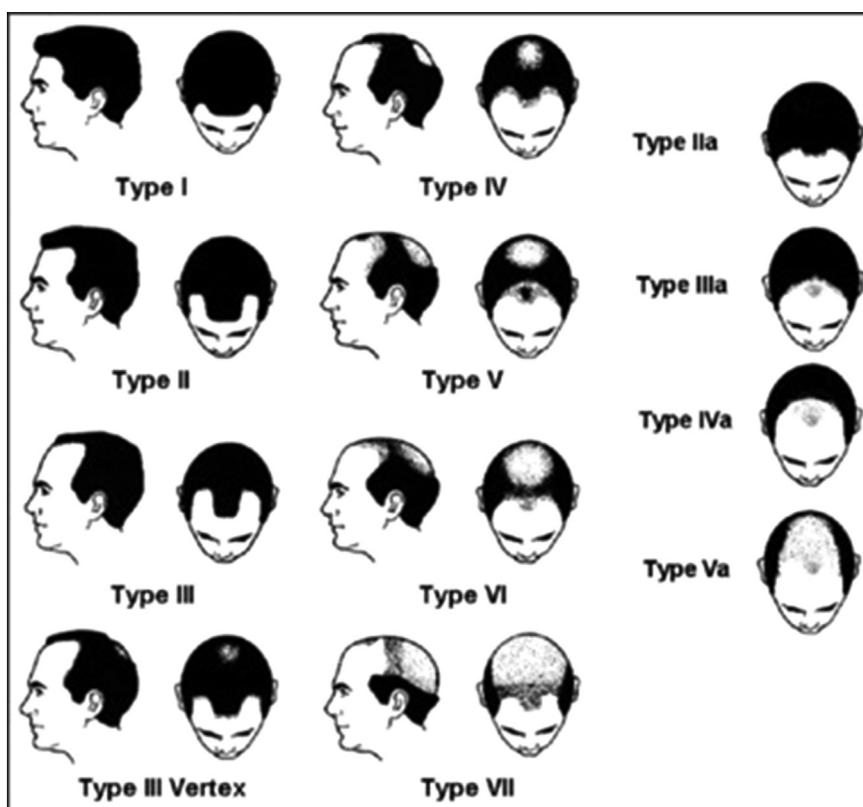


Fig. 2 – Norwood's classification of patterned hair loss in males [23].

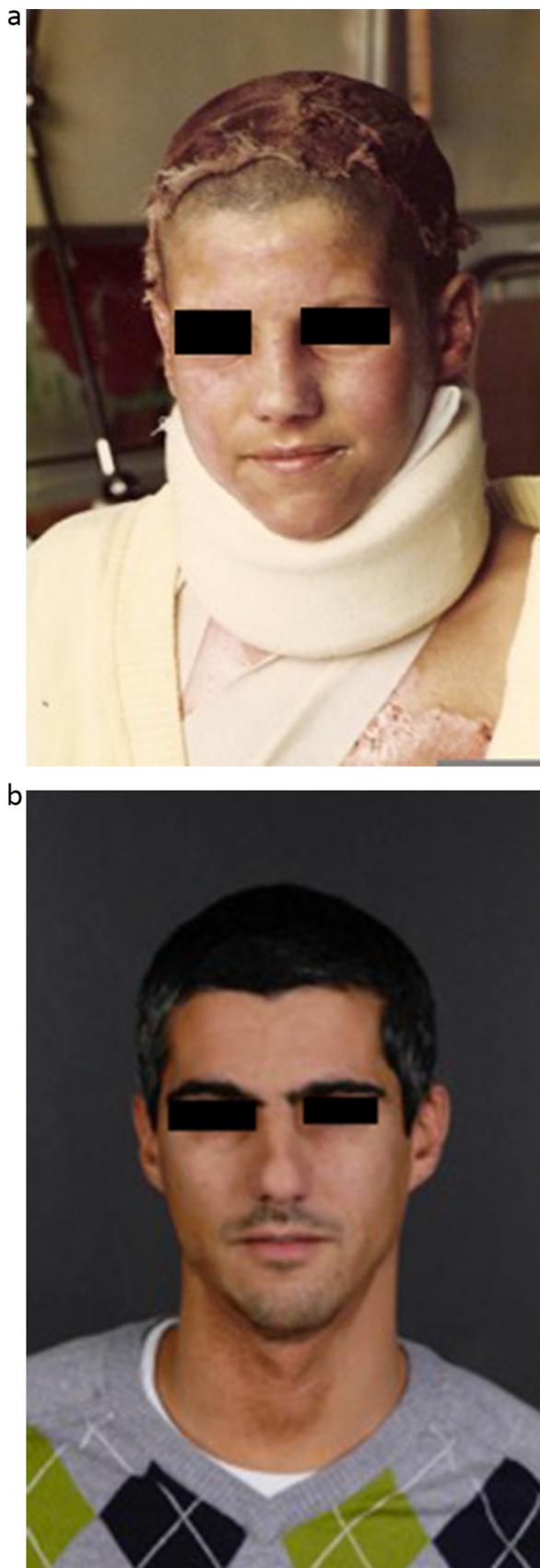


Fig. 3 – Patient #13 at time of accident (a) when he was 13 years of age and had a 13% flame burn, his entire scalp was harvested once. (b) Shows him 12 years later with normal hair growth, no alopecia, no other findings and no subjective complaints.

Comparison of patient characteristics between participants and non-responders did not show any major differences in age, gender, TBSA burned, number of scalp harvests, and length of hospital stay (see [Table 2](#)).

3.2. Analysis of patient interviews

Ten participants had little to no memory of the burn incident. Most (60%) participants reported no negative impact of their childhood burn accident on current everyday life. If reported, being bothered by frequent questions about the nature of their visible scars, avoiding going to public pools or gyms, and trying to hide scars under clothing were the three most commonly mentioned impacts. Of note, all of those subjective complaints were related to the burn scars, none to the donor areas. Three men independently reported an increase in self-confidence as a result of the injury they had suffered. None of the patients recalled any complications or problems at the donor site, none of them had any reconstructive procedures done for scalp donor site problems. Decreased sensation on the scalp (heat of hair dryer) was described by one patient. Another two patients reported scalp hypersensitivity to certain hair products. None of the participants experienced pruritus, pain, or secretion from open areas. With respect to hair growth, one female patient reported decreased hair density compared to other women in her family. All others described their hair growth as similarly dense as in other family members.

3.3. Scalp examination

Standardized physical examination revealed an overall normal age-related hair growth in all participants. Ten male participants showed AGA type Norwood II-IV and one Norwood VI/VII. No female pattern baldness was identified.

We found one single hyperpigmented patch of 2cm² in a female and scalp dryness in five patients (16%). We did not see signs of folliculitis, hypertrophic scars, or keloids. Results of the clinical scalp examination are summarized in [Table 3](#).

In total, fourteen non-androgenetic scarring alopecias were detected in ten participants. They were fairly equally distributed throughout the scalp although never affecting the fronto-parietal region. Two alopecias were located within the burned area of the scalp, 11 alopecias within the non-burned area respectively harvesting zone of the scalp and thereby classified as likely harvest-related, and one was considered unclassifiable. Patients #6 and #23 had two and patient #27 had three alopecic areas. Overall mean size of identified scarring alopecias was 1.47cm² (range 0.1–36cm²), although it was 0.7cm² (range 0.1–2cm²) if only harvest-related alopecias were counted. Most of the areas were categorized as spotty (n=9, 64%), followed by small (n=4, 29%), and large (n=1, 7%). The one large alopecic area seen measured 36cm² (patient #7) and was burn injury-related. This was also the only alopecia that was visible at first glance without parting the hair. The one unclassifiable alopecia was found occipital in patient #17 and measured 4cm². The area of harvest was unfortunately not documented in this patient and there was no evidence of burn injury to the scalp. The patient himself stated in the interview that he remembered the area as a result of a pressure sore due to positioning at the time of acute hospitalization.

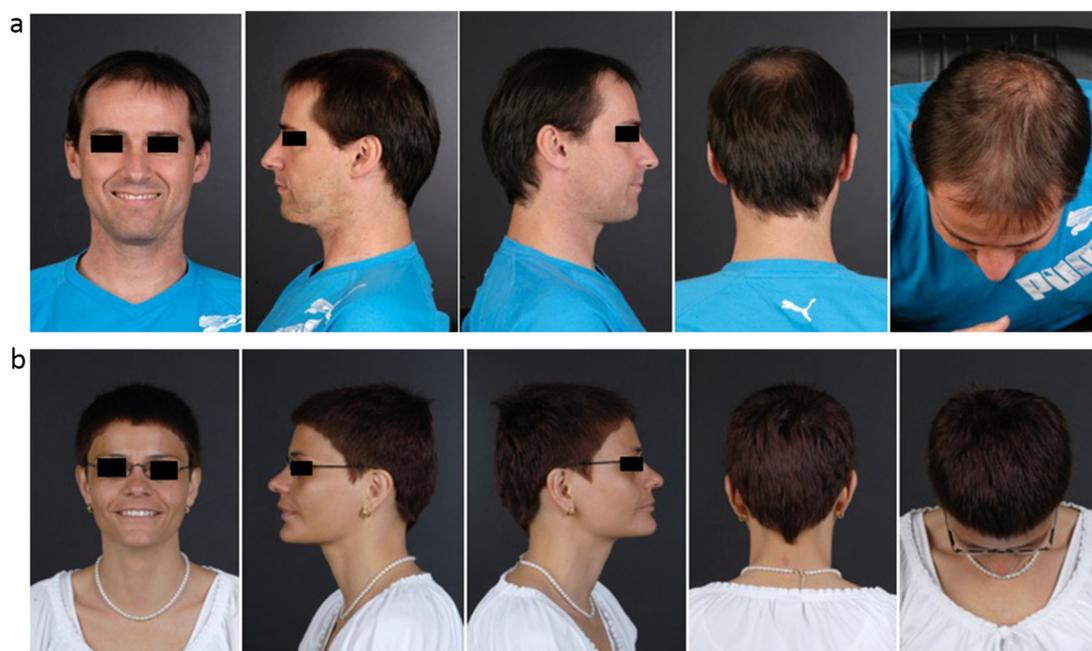


Fig. 4 – Examples of patient photographs. (a) Patient #18: male patient, 30% TBSA burned, 3 consecutive harvests, 28 years after injury, from entire scalp, Norwood type III, no alopecia, dry scalp skin. (b) Patient #21: female patient, 60% TBSA burned, 30 years after injury, 3 consecutive harvests from entire scalp, no alopecia.

None of the participants with harvest-related alopecia was aware of his or her bald spots. The patients with burn injury-related or unclassified alopecia all knew about those areas, but did not have any feelings of disfigurement. Results of the clinical scalp examination are summarized in Table 3. Illustrative photographs of alopecic spots are shown in Fig. 5.

4. Discussion

The scalp has been used as donor area for STSG for more than 40 years and has proven to be reliable and favorable for all age groups. While short-term complications such as alopecia and infections have been described in numerous studies [2,5,7,9,16], reports about long-term results [6,7,15] reached a maximum of only 10 year follow-up. Although there is no doubt that the above studies contributed to popularize the scalp as a donor site for split thickness skin, there is no information about physical impairment or psychological disorders once physiological changes of hair growth settle in during adulthood.

This is the first study to show truly extended long-term results both spanning decades (the maximum is 31 years, the mean is 27 years!) after harvest and also the transition from childhood into mature adulthood. In the global picture, the objective outcomes are distinctly favorable with a very low morbidity, in particular no hypertrophic scars, keloids, or significant iatrogenic baldness. In terms of subjective outcomes, there is a very high patient satisfaction.

The results of the scalp examinations are basically consistent with the majority of the literature with respect to the low morbidity and the absence of hypertrophic scars and keloids that are commonly cited as rare complications [2,9,20].

However, our thorough examinations did reveal a total of 14 alopecic areas in 34 patients, 11 of which were presumably harvest-related. The other three bald areas were related to the burn injury on the scalp or were of other origin, e.g. a pressure sore. Compared to previously published studies, reporting an overall incidence of 0.7–16% [6,7,11,18,21,22], our results of 32% show a higher percentage of harvest-related alopecia. Of note, the quoted studies did not always mention the size of alopecia and there was no confirmation by formal and standardized physical examination as in our study. Our largest harvest-related alopecia measured 2 cm² while the mean size was as small as 0,7 cm². Since no patient was aware of said alopecias, these are considered clinically insignificant, i.e. detection of these “microlesions” is rather the result of thoroughly examining the scalp.

Opposed to the above mentioned results of the majority of articles published, in a single, recently released study examining the overall outcome after split thickness skin graft on a pediatric patient population of black African descent, a significantly high number of complications were found [21]. These included folliculitis and non-healing wounds next to alopecia and could be correlated to the hair types VI–VIII categorized according to De la Mettrie et al. [25]. We did not find any folliculitis nor non-healing wounds, but it must be mentioned that most our patients were of Caucasian descent.

In the literature, postoperative infections and technical errors (harvesting “too deep”) are the most common causes for alopecia [5,6,18,26]. Additionally, alopecia may result from repeat harvestings [5,18].

Donor site infection was not documented in any of our patients. Also, technical errors are not likely resulting in the minute, round shaped lesions (mostly smaller than 1 cm²) as found here. In fact, it is difficult to envision how a correct use of

Table 1 – Patient characteristics.

Patient #	Gender	Age at accident (years)	Burn	TBSA burned %	Localization of burn injury on the scalp	Number of scalp harvests	Area of harvest	LOS (days)	FU time (years)
1	Male	14	Flame	20	–	1	Not documented	16	28
2	Male	11	Flame	23	–	2	Entire scalp x2	45	24
3	Male	2	Scald	25	–	3	Entire scalp x3	57	29
4	Male	2	Scald	18	–	1	Entire scalp	28	28
5	Male	11	Flame	11	–	1	Not documented	45	27
6	Male	12	Flame	55	–	5	Entire scalp x5	157	31
7	Male	2	Scald	23	R temporo-occipital	1	L hemi scalp	48	31
8	Male	12	Electrical	40	–	1	Entire scalp	41	25
9	Male	15	Flame	45	–	2	Entire scalp x2	106	21
10	Male	13	Flame	7	–	1	Parietal scalp	18	23
11	Male	13	Flame	15	–	1	Parietal scalp	27	23
12	Male	6	Scald	12	–	1	Parietal scalp	22	25
13	Male	13	Flame	17	–	1	Entire scalp	26	21
14	Male	9	Flame	25	–	2	Entire scalp x2	91	29
15	Male	3	Scald	29	R temporo-parietal	1	Entire scalp	20	29
16	Male	8	Flame	40	L temporo-parietal	3	Entire scalp x1, hemi scalp x1, parietal scalp x1	69	22
17	Male	8	Flame	17	–	1	Not documented	65	27
18	Male	11	Flame	50	–	3	Entire scalp x3	64	28
19	Female	1	Scald	20	–	1	Entire scalp	17	29
20	Female	3	Scald	18	–	1	Entire scalp	20	28
21	Female	2	Scald	60	–	3	Entire scalp x3	91	30
22	Female	10	Scald	13	–	1	Not documented	23	22
23	Female	3	Scald	11	–	2	Entire scalp x1, not documented x1	25	29
24	Female	3	Scald	27	–	2	Not documented	59	31
25	Female	10	Scald	6	–	1	Parietal hemi scalp	16	25
26	Female	9	Scald	10	–	1	Not documented	27	29
27	Female	4	Scald	20	–	2	Entire scalp x1, not documented x1	52	28
28	Female	2	Scald	26	–	1	Entire scalp	39	30
29	Female	4	Scald	36	–	2	Entire scalp x2	50	29
30	Female	2	Scald	50	–	3	Entire scalp x2, not documented x1	53	30
31	Female	4	Flame	26	–	2	Entire scalp x2	55	29
32	Female	3	Scald	33	–	1	R hemi scalp	33	27
Total n=32	18 male 14 female	Mean 7.03 ± 4.54	n=17 (56%) scald n=13 (41%) flame n=1(3%) electrical	Mean 25.59 ± 3.42%	Total n=3	Total n=54 Mean per patient 1.69 ± 0.96	Not documented n=10 Entire scalp n=35 Partial scalp n=9	Mean 47.03 ± 30.92	27.09 ± 3.04 years

LOS=length of hospital stay, TBSA=total body surface area, R=right, L=left, FU=follow up.

the dermatome yields a rectangular piece of split skin, and there is normal donor site healing except for a small area. On the other hand, how should incorrect dermatome handling result in only one tiny bald spot? Our data best support the explanation of multiple harvest-associated alopecia, since most hairless areas were detected in patients with multiple harvests. Also, whenever more than one alopecic spot was found on the same patient, the scalp was harvested more than once. Clearly, to minimize this risk of harvest, it is crucial to

wait for complete and solid re-epithelialization before re-harvesting the scalp and to ensure this be done by an experienced surgeon.

The scalp is tagged “the only hidden donor site” due to its unique feature of hair growth that could conceal eventual milder harvest-associated alterations, e.g. texture changes [3,9,13]. The question whether androgenetic hair loss over the course of a lifetime could unveil previously hidden changes has never been addressed before. About 30-50% of all men and

Table 2 – Comparison of patient characteristics participants versus non-participants.

	Participants	Non participants
Number	n=32	n=26
Gender (m/f)	18/14	18/8
Age at accident (years)	7,03±4.54	6,9±4.76
Mechanism of burn (%)		
Scald	56	58
Fame	41	38
Electrical	3	3.4
Others	0	3.4
TBSA burned (%)	25,59±3.42	23,5±12.29
Number of harvests	1.69±0.96	1.7±1.06
LOS (days)	47.03±30.92	56±32.16

m = male, f = female, TBSA = total body surface area, LOS = length of stay.

women are affected by AGA [24,27], which is by definition a non-scarring alopecia and therefore easy to differentiate from scarring alopecia. None of our female participants showed signs of AGA, possibly related to the fact that those visible changes usually present later in life in women and are therefore not yet present in our still young female study population. Moreover, female AGA presents with diffuse thinning of the hair rather than completely hairless areas [27]. About 60% of our male participants showed evidence of AGA classified as Norwood I-VIII, which meets the distribution in the general male population for the age group of our study population [27]. In none of our patients previously hidden bald patches were revealed by AGA. Thus, harvesting the scalp is esthetically safe even considering a later AGA and the suggestion to spare the notorious AGA areas when harvesting [9] appears obsolete.

Our patients were highly satisfied with their donor site outcome. Normal dense hair growth was seen in all of our patients. Clinical findings such as dry scalp skin in a few of our patients were mild and clinically insignificant. None of them had documented acute or chronic folliculitis or recalled other infection problems. These findings are consistent with the favorable rating for the scalp as a donor site. The infection rate is low [5,9,12], and reported even lower than for other donor areas [9]. Other well documented advantages include the favorable head to body proportion in younger children [3,4], and a superior color match, particularly when used to graft face and neck [11].

There are a few critical aspects calling for a comment. Chart documentation was less detailed and standardized 30 years ago than it is today. Therefore, some early data are missing. Then, only 56% of patients that met inclusion criteria responded. The reason why almost half of the potential study candidates did not answer remains unclear. However, analysis of participants versus non participants showed similar groups regarding demographics, injury-related data, and number of harvests. Therefore, a relevant selection bias is unlikely.

Our study could not look at eventual differences between ethnic groups since most patients were Caucasians (Fitzpatrick skin types I-III) which are not particularly prone to developing hypertrophic scars or keloids. Whether patients who are more likely to produce problematic scars (Fitzpatrick skin types IV and V) would have shown less favorable results remains unclear but is assumable based on the recent findings regarding the high incidence of complications in patients of black African descent [21].

Finally, the patient numbers are relatively low, as to be expected for such a very long follow-up period, and thus findings reflect a clear-cut trend rather than being statistically significant.



Fig. 5 – Examples of alopecic spots. (a) Two adjacent areas of harvest related alopecia (0.09 cm² and 0.25 cm²) parietooccipital in patient #6 (male, 50% TBSA burned, 5 consecutive harvests from entire scalp, 31 years after injury, Norwood type III). (b) Single 0.25 cm² sized bald area parietooccipital in patient #30 (female, 50% TBSA burned, 30 years after injury, 3 consecutive harvests entire scalp). (c) Single 0.25 cm² sized alopecic area high parietal, in patient #29 (female, 36% TBSA burned, 29 years after injury, 2 consecutive harvests from scalp).

Table 3 – Results of scalp examination.

Patient #	FP skin type	Burn injury on the scalp	# of scalp harvests	Specific area of harvest	Androgenetic alopecia	Non-androgenetic alopecia			Abnormal sensitivity	Abnormal pigmentation	Other findings
						Location alopecia	Assumed origin of alopecia	Size			
1	IV	No	1	Not documented	NW VI/VII	-	-	-	-		
2	III	No	2	Entire scalp x2	-	-	-	-	-		
3	II	No	3	Entire scalp x3	-	-	-	-	-	Dry skin	
4	III	No	1	Entire scalp	-	-	-	-	-		
5	II	No	1	Not documented	-	-	-	-	-		
6	III	No	5	Entire scalp x5	NW III	Occipitoparietal	Harvest	0.09cm ²	-		
						Occipitoparietal	Harvest	0.25cm ²			
7	III	R tempo- poro- okkzipital	1	L hemi scalp x	NW IV	R temporo occipital	Burn injury	36cm ²	-		
8	I	No	1	Entire scalp	NW III	-	-	-	-		
9	III	No	2	Entire scalp x2	-	-	-	-	-		
10	III	No	1	Parietal scalp	NW II	-	-	-	-		
11	III	No	1	Parietal scalp	-	-	-	-	-		
12	II	No	1	Parietal scalp	NW III	-	-	-	-		
13	IV	No	1	Entire scalp	-	-	-	-	-		
14	III	No	2	Entire scalp x2	NW IV	-	-	-	-		
15	III	R tempo- poro- parietal	1	L hemi scalp x1, occipital scalp x1	NWII	-	-	-	-		
16	II	L temporal	3	Entire scalp x1, hemi scalp x1, parietal scalp x1	NW II	L temporal	Burn injury	1cm ²	-		
17	III	No	1	Not documented	NW I	High occipital	Unclassifiable	4cm ²	-		
18	III	No	3	Entire scalp x3	NW III	-	-	-	↑	↑	
19	II	No	1	Entire scalp	-	High parietal	Harvest	0.09cm ²	-	Dry skin	
20	II	No	1	Entire scalp	-	-	-	-	-		
21	II	No	3	Entire scalp x3	-	-	-	-	-		
22	III	No	1	Entire scalp x1	-	-	-	-	-	↑	
23	II	No	2	Entire scalp x1, not documented x1	-	R occipital	Harvest	1cm ²	-	↓	
24	III	No	2	Not documented	-	R temporal	Harvest	1.5cm ²	-		
25	II	No	1	Parietal hemi scalp	-	Parieto-occipital	Harvest	0.25cm ²	-		
26	II	No	1	Not documented	-	-	-	-	-	Dry skin	
27	II	No	2	Entire scalp x1, not documented x1	-	High parietal	Harvest	1.5cm ²	-		

Table 3 (continued)

Patient #	FP skin type	Burn injury on the scalp	# of scalp harvests	Specific area of harvest	Androgenetic alopecia	Non-androgenetic alopecia			Abnormal sensitivity	Abnormal pigmentation	Other findings
						Location alopecia	Assumed origin of alopecia	Size			
28	II	No	1	Entire scalp	-	L temporal R occipital	Harvest Harvest	0.5 cm ² 2 cm ²			Dry skin
29	III	No	2	Entire scalp x2	-	High parietal	Harvest	0.25 cm ²	↑		
30	II	No	3	Entire scalp x2, not documented x1	-	Parieto-occipital	Harvest	0.25 cm ²	-		
31	II	No	2	Entire scalp x2	-	-	-	-	↑		
32	II	No	1	R hemi scalp	-	-	-	-	↓		
Total: 32	I 1 II 15 III 14 IV 2		1.69 ± 0.96 54	Entire scalp 35 Partial scalp 10 Not documented 9	- n=11		Harvest 11 Burn 2 Unclassifiable 1	max 36 cm ² min 0.09 cm ² mean - 1.47 ± 6.36 cm ²	2x hyper 2 hypo	3	5

L=left, R=right, FU=follow up, NW=Norwood type.

5. Conclusions

This study reports on the longest follow-up after harvesting the scalp in children ever published. It produces undeniable and compelling evidence that this unique donor site is an ideal first choice when there is a need for STSG in children of Caucasian decent (Fitzpatrick skin types I-III). The yield is generous and matches basically all grafting requirements, healing is rapid, multiple harvests are possible, complications are rare, and the outcome decades later is almost spotless.

Declaration of interest

None.

Declaration of authorship

Kathrin Neuhaus: Substantial contributions to the conception and design of the work; the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Clemens Schiestl: Substantial contributions to the conception and design of the work; the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Rosmarie Adelsberger: Substantial contributions to the conception and design of the work; the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Sophie Böttcher-Haberzeth: Substantial contributions to the conception and design of the work; the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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