

# Tumours of the Scalp: A Review of Ten Cases

Emmanuel J. K. Adu

*Department of Surgery, School of Medical Sciences, College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

**Abstract: Background:** The scalp is a common site for the development of tumours. Most of these tumours are benign; among the malignant ones, squamous cell carcinoma (SCC) and basal cell carcinoma (BCC) predominate. In Ghana patients with scalp tumours do not report to hospital unless they are symptomatic. Data on the condition is therefore scanty. **Patients and Methods:** The objective of the study was to document the hospital prevalence and the management outcome of patients with scalp tumours. Patients with tumours of the scalp reporting at the Reconstructive Plastic Surgery and Burns Unit (RPSBU) at Komfo Anokye Teaching Hospital (KATH) who were managed by the author between June 2003 and June 2009 were entered into the study. The patients were examined clinically and the diagnosis confirmed by biopsy. The scalp tumours were excised and the defect closed directly, skin grafted, or repaired with a flap as appropriate. **Results:** Ten patients with eleven scalp tumours were managed during the study period from June 2003 to June 2009, made up of four males and six females. Their ages ranged from 16 to 70 years, with a mean age of 41.7 years. Two benign scalp tumours, a sebaceous cyst and a sebaceousoma were located in the frontal region; five cases of SCC and one case of basosquamous cell carcinoma (BSC) in the parietal region, two cases of SCC in the temporal region, and one case of SCC in the occipital region of the scalp. Eight of the tumours developed de novo from the scalp; one developed from a chronic burn scar (Marjolin's ulcer); two tumours developed from the scalp of a patient with xeroderma pigmentosum. Two patients had excision and direct closure of the defect; six had excision and skin grafting; two had excision and flap repair. One patient had block dissection of the left cervical lymph nodes, and two patients had adjuvant radiotherapy. **Conclusions:** Most tumours of the scalp presenting at the RPSBU at KATH are SCC which developed de novo. Chronic burn scars and xeroderma pigmentosum were some of the aetiological factors identified. Early lesions can be cured by excision and skin grafting.

**Key words:** Scalp tumours, squamous, basal, basosquamous, Marjolin's ulcer, xeroderma pigmentosum.

## 1. Introduction

The scalp consists of five layers of soft tissue covering the calvaria. It extends from the superior nuchal line at the posterior aspect of the head to the supra-orbital margins, that is, over the forehead to the eyebrows. Laterally the scalp extends into the temporal fossae to the level of the zygomatic arches. The five layers of the scalp comprise skin, connective tissue, epicranial aponeurosis, loose connective tissue and periosteum or pericranium [1].

The scalp is a common site for the development of tumours. These may be benign or malignant, primary or secondary. These may include conditions such as

epidermoid cysts, pilar tumours [2], actinic keratosis [3], squamous cell carcinoma (SCC) and basal cell carcinoma (BCC) [4]. Most scalp tumours are benign; among the malignant scalp tumours, SCC and BCC are the most frequent in both male and female patients, accounting for more than 50%, while metastatic tumours rank second with 12.8% [4].

About 20% of scalp tumours are malignant, and when asymptomatic or small in size may be covered with hair and neglected by patients leading to delay in detection with poor results [5]. In Ghana tumours of the scalp are not uncommon; however because such lesions can be hidden by wearing wigs, head kerchiefs, scarfs, caps, or hats, patients may present only when such lesions are painful, have ulcerated, are bleeding, discharging purulent or offensive fluid or preventing the performance of an activity of daily living such as

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**Corresponding author:** Emmanuel J. K. Adu, BSc, MB ChB, FWACS, FGCS, research fields: congenital anomalies, burns reconstruction, paediatric plastic surgery. E-mail: aduemmanuel@hotmail.com.

carrying head loads. Data on the condition in Ghana is therefore scanty.

A prospective study of patients with tumours of the scalp presenting at the Reconstructive Plastic Surgery and Burns Unit (RPSBU) of Komfo Anokye Teaching Hospital (KATH) in Kumasi was undertaken in June 2003. The objective of the study was to document the hospital prevalence and the management outcome of patients with scalp tumours.

## 2. Patients and Methods

Within the period from June 2003 to June 2009, patients presenting at the RPSBU at KATH with tumours of the scalp who were managed by the author were entered into the study. The patients were examined clinically. Relevant clinical history included, the name, age, sex, address, occupation, mode of onset of disease, disease progression, any previous illness, and any previous surgery. Examination of the lesion and any other area of relevance to exclude a hidden primary or secondary tumour was done. A clinical photograph of the lesion(s) was taken.

A CT scan of the skull to exclude bony involvement or penetration, a chest x-ray and an abdominal ultrasound to exclude a primary or metastatic tumour was done. All patients were assessed and found fit for anaesthesia by an anaesthetist. The scalp lesions were

excised under general anaesthesia with 2 cm free margins. The underlying bone was resected where there is bony involvement. The defect created was reconstructed with split thickness skin grafts, or with scalp flaps as appropriate. Where scalp flaps have been used, the flap donor sites were split skin grafted.

## 3. Results

A total of ten patients with eleven tumours of the scalp, made up of four males and six females, were managed at the RPSBU at KATH during the study period from June 2003 to June 2009. Their ages ranged from 16 to 70 years, with a mean age of 41.7 years. The clinical details of the ten patients with scalp tumours are shown in Table 1.

## 4. Clinical Details

### 4.1 Site of Lesion

The central area of the scalp, involving the two parietal regions with the sagittal suture between them, was the site for most malignant scalp tumours in this study (Fig. 1).

Five cases of SCC and one case of basosquamous cell carcinoma (BSC) were located at this site. The other sites that had malignant lesions outside this

**Table 1** Clinical details of patients with scalp tumours.

Name	Age	Sex	Site of lesion	Surgical procedure	Histology
AD	70	F	Parieto-occipital	Excision & STSG	Squamous cell carcinoma
LA	36	M	Parieto-sagittal	Excision & STSG	Squamous cell carcinoma
JS	31	F	Parieto-sagittal	Excision & STSG	Basosquamous cell carcinoma
NB	62	F	Parieto-frontal	Excision of lesion Resection of calvarium Scalp flap & STSG	Squamous cell carcinoma
SA	18	M	Frontal	Excision & direct closure	Sebaceous cyst
AK	48	F	Temporal	Excision & STSG	Squamous cell carcinoma
PT	70	F	Parieto-sagittal	Excision of lesion Resection of calvarium Scalp flap & STSG	Squamous cell carcinoma
CT	21	M	Frontal	Excision & direct closure	sebeceoma
FM	45	M	Parieto-sagittal	Excision & scalp flap	Squamous cell carcinoma
AM	16	F	Parietal, temporal	Excision & STSG	Squamous cell carcinoma



**Fig. 1** Squamous cell carcinoma involving the centre of the scalp.

region were the temporal (two cases) and occipital (one case) regions.

The two benign tumours managed in this study developed exclusively in the frontal region of the scalp.

One patient with xeroderma pigmentosum had two scalp tumours: one located on the left parietal region, and the other at the left temporal region of the scalp. In addition the patient had numerous Hypopigmented macules on the face, scalp, neck, chest and trunk (Fig. 2).

#### 4.2 Surgical Procedures

Excision of the tumour with direct closure of the defect was possible only with benign tumours (two cases).

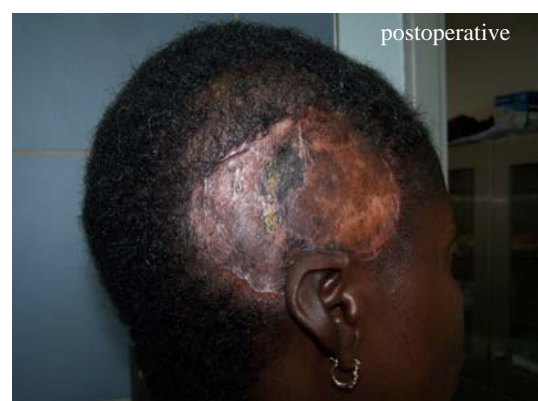
For six (60%) patients the malignant scalp lesions were excised and the defect repaired with split thickness skin grafts with satisfactory healing (Fig. 3).

In one patient, (PT), the outer table of the calvarium was resected; in another patient (NB), a whole segment of calvarium, about 4 cm by 5 cm, had to be resected. Scalp flaps based on the superficial temporal artery (in the case of PT) and occipital artery (in the case of NB) were used to repair the defects. In addition NB had a block dissection of the left cervical, pre- and post auricular lymph nodes.

After healing of the surgical wounds NB and PT had adjuvant radiotherapy applied to a localized area of the



**Fig. 2** A 16 year old girl with xeroderma pigmentosum.



**Fig. 3** Squamous cell carcinoma of the temporal region of the scalp (post-operative).

scalp covering the original site of the tumour with 2 cm margins.

No recurrence of the tumours was observed after a mean follow up period of two years. All the malignant scalp lesions were primary in origin. No secondary or metastatic lesions to the scalp were encountered during the study period.

#### 4.3 Aetiological Factors

Of the nine malignant tumours managed in this series, six arose de novo from the scalp; one patient (LA) developed a Marjolin's ulcer of the scalp 30 years following thermal burns (Fig. 4a, 4b, 4c).



**Figs. 4** (a, b), Marjolin's ulcer of scalp, 30 years following thermal burns. (c) post operative, (excision and skin grafting).

Two tumours developed from the scalp of one patient with xeroderma pigmentosum.

## 5. Discussion

Primary malignant tumours of the scalp are mostly epithelial in origin, with a few adnexal and connective tissue tumours. Only two percent of epithelial tumours of the skin are located on the scalp. BCC is the most predominant, followed by SCC and malignant melanoma (MM) [6]. This global pattern of distribution of scalp tumours may be different in Ghana. Adu and Annan [7] in a prospective study of 31 primary malignant skin tumours in Ghanaians observed equal proportions of MM (42%) and SCC (42%); the rest were BCC (3%) and sarcomas (13%). Whilst all the cases of MM were confined to the foot, especially the sole, 31% of the SCC were confined to the scalp, with the rest distributed to other parts of the body [7]. It appeared from the study that SCC has a higher predilection for the scalp (31%) than the lower limbs (15.4%) in Ghanaians.

Eight of the tumours excised in the current study were confirmed histologically as SCC; one was diagnosed as BSC. Both conditions are keratinocytic tumours which are derived from epidermal and adnexal keratinocytes, and comprise a large spectrum of lesions ranging from benign proliferations (e.g., acanthomas) to malignant SCC. In SCC the component cells show variable squamous differentiation [8]; they arise in areas of direct exposure to the sun, such as forehead, face, ears, scalp, neck, and dorsum of the hands.

BCCs are a group of malignant cutaneous tumours characterized by the presence of lobules, columns, bands, or cords of basaloid cells. BCCs that are associated with squamous differentiation are termed basosquamous carcinoma (BSC) [8]. Only one case of BSC was encountered in the current study.

Risk factors for keratinocytic tumours include cumulative sun exposure and fair skin. About 65% occur in men, in hair bearing skin rather than in bald areas. About half occur in the temporal region followed

by post-auricular and occipital areas [9]. In the current study, about 55% of the lesions occurred in the parietal region of the scalp; only 18% of the lesions occurred in the temporal region. Moreover 60% of the patients in this study (N = 10) were women compared to 65% men globally [9].

The occurrence of these tumours in the central area of the scalp, and the involvement of more women than men in this study raises the suspicion of trauma as a contributory factor to the aetiology. This site is the area most often used to carry head loads, a daily activity for most farmers, porters, hawkers, artisans, and construction workers. Further study on a larger population sample to shed more light on this aspect is recommended.

The presence of a chronic burn scar increases the likelihood of development of a Marjolin's ulcer or SCC within the confines of the wound. This can be aggressive with increased tendency to metastasize to the regional lymph nodes [10]. One case of Marjolin's ulcer of the scalp managed in this series developed 30 years following thermal burns to the head and neck.

The scalp, because of its rich vascularity, is a common repository for metastatic tumours. A study by Connor and Cohen [11], found breast cancer as the primary malignancy in 84% of the patients with neoplastic alopecia; other tumours were gastric carcinoma, colon carcinoma, cervical carcinoma, and trophoblastic tumours. In the current study, no malignant scalp secondaries were found.

Xeroderma pigmentosum is an autosomal recessive disease with sun sensitivity, photophobia, early onset of freckling and subsequent neoplastic changes on sun exposed surfaces. Patients with xeroderma pigmentosum develop multiple malignant neoplasms at an early age. The tumours include SCC and BCC; in 3% of the patients MM develops [12]. The condition is due to a deficiency of the enzyme thiamine dimerase. Thiamine absorbs ultraviolet light and forms dimers. These dimers cannot be broken down due to the deficiency of the enzyme. A build-up of thiamine

dimers induces defects in the structure of DNA which initiates carcinogenesis. Patients have been reported in all races including Whites, Asians, Blacks, and Native Americans. There is no significant difference between sexes.

Management of patients with xeroderma pigmentosum is based on early diagnosis, life-long protection from ultraviolet radiation exposure, and early detection and treatment of neoplasms [13]. A study to elucidate the prevalence of xeroderma pigmentosum in Ghana is recommended.

The treatment of choice for malignant tumours of the scalp is surgical excision. Irradiation is less effective. The scalp's thick galeal layer offers a natural barrier to vertical growth of cutaneous malignant neoplasms. Once penetrated the areolar tissue in the subgaleal plane offers little resistance to lateral spread. The periosteum of the scalp and the outer cortex of the skull also provide an effective barrier to tumour invasion. Once violated tumour can spread in the diploic space and through perforating channels to the dura [14, 15]. Excision of such a tumour would involve resection of the involved segment of the skull and reconstruction with a scalp flap, with or without cranioplasty.

The flaps commonly used are based on branches of the superficial temporal or occipital arteries, depending on the location of the defect. Where cranioplasty is indicated, autogenous bone is the most reliable material. Iliac crest bone grafts, split rib grafts, or calvarial bone grafts can be used [16].

## 6. Conclusion

Most of the scalp tumours seen at KATH are SCCs arising de novo. Chronic burn scars and xeroderma pigmentosum are some of the aetiological factors identified. Early lesions can be cured by excision and skin grafting.

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