Evaluation of The Diagnosis and Treatment of Non-Melanoma Skin Cancer and its Impacts on The Prevention Habits in a Specific Population of Southeastern Brazil

Rafael Denadai Pigozzi Silva[1], Luís Ricardo Martinhão Souto[2]

[1]*School of Medical Sciences at Universidade de Marília (UNIMAR), Marília, São Paulo, Brazil*

[2]*Division of Plastic Surgery, Department of Surgery, School of Medical Sciences at Universidade de Marília (UNIMAR), Marília, São Paulo, Brazil*

Correspondence: *Luís Ricardo Martinhão Souto, M.D., Ph.D., Department of Surgery, School of Medical Sciences, Universidade de Marília (UNIMAR) Av. Rio Branco, 1132 - Cj. 41-Marília-SP - CEP 17502-000 - Brazil Tel/fax: +551434221668 E-mail: lrmsouto@yahoo.com.br*

ABSTRACT

Aim: The non-melanoma skin cancer (NMSC) is the most common cancer in humans. Diagnosis is clinical and treatment is based on complete surgical excision and histopathologic confirmation. Perceptions of risk and preventive behavior after treatment are relatively unknown. This study was aimed at evaluating the accuracy of NMSC diagnosis compared with anatomopathological, and the effectiveness of surgical treatment and NMSC prevention methods in a specific population.

Method: Twenty-five patients that underwent 42 resections of skin lesions clinically diagnosed as NMSC were assessed in relation to factors that are specific to these lesions (evolution time, size and histological type), surgical treatment, postoperative follow-up (relapses and/or new lesions), knowledge and previous use of prevention methods and impact of the diagnosis and treatment on the prevention habits.

Result: All patients had a history of unprotected sun exposure. Most lesions were observed on fair-skinned individuals (classes I to III according to Fitzpatrick). The overall diagnostic accuracy was 76.19%. There were ten new lesions and only one case of relapse during follow-up. Only eight patients reported sporadic use of preventive methods after the clinical diagnosis and treatment of injuries.

Conclusion: Diagnostic accuracy was considered satisfactory. Surgical treatment with pre-determined safety margins was effective in most cases. Diagnosis and surgical treatment have not determined a positive impact on the adoption of preventive measures.

Key words: Basal cell carcinoma, diagnosis, primary prevention, skin cancer, squamous cell carcinoma

Güneydoğu Brezilya'da Özel Bir Populasyonda Melanoma Dışı Cilt Kanserlerinin Tanı ve Tedavisi ve Bunun Önleme Alışkanlıklarına Etkisinin Değerlendirilmesi

Amaç: Melanom dışı cilt kanserleri (MDCK) insanlarda görülen en sık kanser türüdür. Tanı klinik olarak konulur ve tedavide temel tam cerrahi eksizyon ve histopatolojik doğrulamadır. Tedaviden sonraki risk algısı ve önleme davranışı nispeten iyi bilinmemektedir. Bu çalışmada özel bir populasyonda anatomopatolojik ile mukayese edildiğinde MDCK tanısının doğruluğunun ve MDCK önleme metodları ve cerrahi tedavi etkinliğinin değerlendirilmesi amaçlandı.

Metod: Klinik olarak NMSC olarak tanı konulan 42 deri lezyonu rezeksiyonu yapılan 25 hasta lezyonlara (değerlendirme zamanı, boyutu ve histolojik tipi) spesifik olan faktörler, cerrahi tedavisi, postop izlem (relaps ve yeni lezyonlar), bilgi ve daha önce koruyucu önlemlerin kullanılması ve önleyici davranışlarında tedavi ve tanının etkisi ile ilişkisi değerlendirildi.

Sonuç: Tanısal doğruluğun tatmin edici olduğu düşünüldü. Vakaların büyük çoğunluğunda daha önceden güvenlik marjinleri tayin edilerek yapılan cerrahi tedavi etkindi. Tanı ve cerrahi tedavi önleyici tedbirlerin alınmasında pozitif bir etkiye sahip değildi.

Anahtar kelimeler: Bazal hücreli kanser, tanı, birincil önleme, cilt kanseri, squamoz hücreli kanser

INTRODUCTION

Skin cancer is a growing worldwide problem, especially in fair-skinned populations (1-3), therefore it is considered a global epidemic (2, 4, 5), leading to a huge demand and increased expenses with health services (3). The term non-melanoma skin cancer (NMSC) is primarily concerned with basal cell carcinoma (BCC – 75% of cases) and squamous cell carcinoma (SCC–20% of cases) (6). It is the cutaneous malignant tumor most commonly diagnosed in white individuals (2), with an incidence 18 to 20 times greater than melanoma (4).

The increasing incidence of this cancer is attributed to ultraviolet radiation (UV) (4, 5), considered the main environmental risk factor for its development (2, 4, 5). The increase in the number of NMSC cases in white populations, evidenced in recent decades, is probably due to a combination of increased UV exposure with the depletion of the ozone layer and increased longevity (4, 6). It is acknowledged that little is known about precursor lesions for BCC (1, 4), believing that this will evolve "de novo" (4). In the case of SCC, actinic keratosis and Bowen's disease (SCC in situ) are considered precursor lesions (1, 4). NMSC tends to be located in areas more exposed to UV radiation, such as head and neck (4, 6), what brings, even when there is a good prognosis (2, 3, 5, 6), a high morbidity rate (1, 5) through the evolution of the lesion or as a treatment sequela (3, 5).

The diagnosis of NMSC is predominantly clinical, and it is confirmed by histopathologic evaluation (1, 7). The surgical excision with predetermined safety margins is the most appropriate treatment (1, 8, 9). Prevention and early detection in NMSC cases are fundamentally important

to hold down the rise in incidence rates (4), reduce financial costs (2, 3, 5) and morbidity (1, 3, 5). Despite the importance of prevention, risk perception and preventive behaviors after treatment are relatively unknown (10).

The aim of this study was to evaluate, through a prospective observational study, the accuracy of clinical diagnosis of NMSC when compared with the histopathologic analysis, and the effectiveness of surgical treatment and prevention methods in a specific studied demographic population.

MATERIALS AND METHODS

This study was approved by the Ethics and Human Research Committee at School of Medical Sciences at Universidade de Marília (UNIMAR) and it is in accordance with the Helsinki Declaration of 1975, as amended in 1983. It was conducted a prospective observational study of all 25 patients enrolled in the service of plastic surgery at School of Medical Sciences at UNIMAR who underwent surgery for resection of skin lesions clinically diagnosed as NMSC, from February 2008 to September 2009. We assessed the time and the clinical history of skin lesions, the surgical treatments carried out, the anatomical locations of the skin lesions and the histological types identified after surgical resections, duration of postoperative follow-up and recurrences and/or new skin lesions.

All patients were called during the postoperative follow-up to respond to a clinical questionnaire specifically designed to evaluate and confirm previous data regarding personal and family risk history for the development of

Table 1. *Distribution of patients (n:25) according to the peak UV-radiation hours (15).*

Hours of sun exposure	Patients	
	n	%
08h – 10h and/or 16h – 18h	2	08
10h – 16h	23	92
Total count	25	100

NMSC, knowledge and previous use of prevention methods and impact of the diagnoses and treatments of skin lesions on habits for the NMSC prevention.

RESULTS

The 25 evaluated patients presented 42 distinct skin lesions with hypotheses of NMSC, all treated surgically. Fifteen patients (54.1%) were women and ten (45.9%) men. Ages at diagnoses ranged from 34 to 88 years old, with an average of 63.88 years. All patients were from the city of Marília, in São Paulo State, southeastern Brazil. Four patients had a body mass index (BMI) greater than 30 kg/m^2 (one had a BMI above 40 kg/m^2). Smoking was reported by eight patients and alcoholism by three. Four patients had no formal instruction and sixteen had only incomplete elementary school. All 25 patients presented a previous history of sun exposure, eighteen reported being exposed continuously (occupational) and seven reported intermittent exposure (leisure). The sun exposure times for patients are presented in Table 1. Sixteen patients had occupations in rural areas, reporting the beginning of professional activities by eight years old. Only four patients had indoor activities without direct sunlight. Seven patients reported a positive family history of skin cancer. During the clinical examination, 18 patients reported more than five episodes of burns due to sun exposure throughout life. Most skin lesions (36 of 42 found) were observed in fair-skinned individuals (22 of 25 patients), belonging to classes I to III of Fitzpatrick (11) (Table 2).

The majority (95.23%) of the 42 skin lesions observed in the 25 patients had an evolution of more than six months. Clinically, 47.62% of the lesions corresponded to BCC and 52.38% to SCC. After surgical resection of the

Table 2. *Distribution of Fitzpatrick skin phototypes (11) according to the number of patients (n:25), skin lesions with clinical hypothesis of NMSC (n:42) and lesions confirmed histologically as NMSC (n:32).*

Fitzpatrick phototypes	Patients		Clinical hypothesis of NMSC		Lesions confirmed as NMSC	
	n	%	n	%	n	%
I	2	8	6	14.29	5	15.62
II	10	40	13	30.96	10	31.25
III	10	40	17	40.47	12	37.50
IV	3	12	6	14.38	5	15.62
V-VI	-		-		-	
Total	25		42		32	

NMSC: Non-melanoma skin cancer

Table 3. *Comparative analysis between clinical hypothesis and histological examination of lesions surgically removed (n:42)*

NMSC	Clinical hypothesis		Pathological diagnosis concordant		Accuracy
	n	%	n	%	%
BCC	20	47.62	14	43.35	70
SCC	22	52.38	18	56.25	81.82
Total count	42	(100)	32	100	76.19

NMSC: Non-melanoma skin cancer, BCC: basal cell carcinoma, SCC: squamous cell carcinoma

Table 4. *Discordant pathological diagnosis of clinical hypotheses (n:10)*

Pathological diagnosis	Clinical hypothesis			
	BCC		SCC	
	n	%	n	%
Actinic keratosis	5	83.33	2	50
Seborrhoeic keratosis	1	16.67	-	
Dermal fibrosis	-		1	25
Acute folliculitis	-		1	25
Partial count	6	100	4	100
Total count	10	100		

BCC = basal cell carcinoma; SCC = squamous cell carcinoma

Table 5. Distribution of lesions in different parts of the body according to the pathologic examination (n:42)

Anatomical site	BCC n:14	SCC n:18	Actinic keratosis n:7	Acute folliculitis n:1	Dermal fibrosis n:1	Seborrhoeic keratosis n:1
Head and neck						
Scalp	-	2	-	-	-	-
Forehead	1	2	1	-	-	-
Nose/eyelid/ chin	9	1	2	1	1	-
Temple	-	1	-	-	-	-
Cheek	-	1	-	-	-	-
Lip	-	-	-	-	-	-
Ear	2	-	-	-	-	-
Neck	1	2	2	-	-	1
Torso						
Shoulder	-	-	-	-	-	-
Chest	1	1	-	-	-	-
Abdômen Back	-	-	-	-	-	-
Extremities						
Arms	-	1	-	-	-	-
Forearm	-	4	1	-	-	-
Wrist/hand	-	2	1	-	-	-
Thigh	-	1	-	-	-	-
Leg						
Foot/ankle	-	-	-	-	-	-
Partial count	14	18	7	1	1	1
Total count	42					

BCC = basal cell carcinoma; SCC = squamous cell carcinoma

lesions, the definitive diagnoses were ratified by pathological examinations and 14 cases of BCC, 18 SCC, 7 actinic keratosis, 1 seborrhoeic keratosis, 1 acute folliculitis and 1 dermal fibrosis were confirmed. The global diagnostic accuracy (agreement) was 76.19% (Tables 3 and 4). The anatomical sites of incidence are presented on Table 5 according to histological types of lesions found in pathological examinations. Table 6 shows the diagnostic accuracy according to the anatomical sites.

Regarding size, 12 cases of SCC were smaller than two centimeters, five had between two and five centimeters and only 1 case was larger than five centimeters. In cases of BCC, 8 lesions were smaller than two centimeters and 6 had two to five centimeters. In the histopathologic evaluation 9 SCC cases presented a well- differentiated standard, 5 a moderately differentiated pattern, 1

a little differentiated pattern, and 3 cases corresponded to SCC in situ. For the cases of BCC, 9 presented a nodular pattern, 3 had a sclerodermiform pattern, and 2 had and ulcerated pattern. Only one lesion (moderately differentiated SCC) presented involved lateral margins on histopathologic examination.

In 20 patients, 32 skin lesions were confirmed by anatomopathological examinations, as corresponding to the clinical hypotheses formulated before the surgeries. The average number of skin lesions confirmed as SCC and BCC for each individual was 1.54 and 1.44, respectively; ranging from one to three lesions per patient. No patient had more than a different histological type of NMSC (BCC or SCC) in the evaluated period. The mean postoperative follow-up was 19.75 months, ranging from 12 to 24 months. During follow-up, nine patients

Table 6. Distribution of lesions in different parts of the body according to the diagnostic accuracy (n:42)

Anatomical site	Diagnostic accuracy (%)	
	BCC	SCC
Head and neck		
Scalp	-	100
Forehead	100	66.67
Nose/eyelid/chin	69.23	33.33
Temple	-	100
Cheek	-	100
Lip	-	-
Ear	100	-
Neck	50	100
Torso		
Shoulder	-	-
Chest	100	100
Abdomen Back	-	-
Extremities		
Arms	-	100
Forearm	-	100
Wrist/hand		66.67
Thigh		100
Leg		
Foot/ankle	-	-

BCC = basal cell carcinoma; SCC = squamous cell carcinoma

Table 7. Presence of relapse (N=1) and new skin lesions (n:10) according to the pathologic examination

Variable	Skin Lesions (n)
Relapse	
BCC	-
SCC	1
New lesions	
BCC	4
SCC	5
Actinic keratosis	1

BCC = basal cell carcinoma; SCC = squamous cell carcinoma

DISCUSSION

According to a recent survey (2), the highest incidence of NMSC was found in Australia, in Zimbabwe among the inhabitants of European origin, and in Brazil. In the later, the National Cancer Institute (INCA) (12) estimated that, for the year 2010, the new cases of NMSC correspond to 23.3% of all new cancer cases in the country.

The study presented here was conducted in a specific socio-demographic population, living in the city of Marília, São Paulo State, in southeastern Brazil. The city of Marília is located at latitude of 22.21° south and longitude 49.56° west. It has an estimated population of 225.938 inhabitants for the year of 2009, and this region was colonized mainly by Italian, Spanish, Japanese and Syrian immigrants (13). The ultraviolet index (UVI) estimated for the city of Marília (UVI = 10) is considered very high (14).

The risk for NMSC development is higher among residents of environments with high solar radiation (1). The power of solar radiation depends on many environmental factors, including time of day (higher between 10:00 AM and 4:00 PM), season (higher in the summer), latitude (higher in the tropics), altitude (the higher, the more increased), weather (higher in the absence of clouds) and reflection of radiation (increases in the presence of materials that reflect the sun such as asphalt, water, snow and sand) (1, 4, 6, 15).

Over 80% of NMSC occur in body areas that are most exposed to sunlight, such as head and the back of hands (3, 6), but it may also appear on non-exposed sites (6). BBC occurs predominantly in the face, trunk and shoul-

presented ten new skin lesions (NMSC) in anatomical sites different from the originally treated ones; these new lesions were surgically removed and studied by histopathology. There was only one case of relapse during the study period (Table 7).

All the studied patients reported that, before having skin lesions, they were unaware of any relationship of skin cancer with sun exposure, and they also ignored any prevention method or self-examination technique of NMSC. After clinical diagnoses of the lesions, surgical treatment and during follow-up appointments after surgery, all patients reported being informed, oriented and having knowledge about prevention and self-examination methods that they previously denied knowing. However, only eight patients said they were making sporadic use of the preventive methods taught.

ders (16), differing from the SCC that arises most often in the limbs (16) and this was also observed in this study.

The histological type varies according to the profile of sun exposure (2). Chronic sun exposure seems to be the main cause of SCC (1-3, 9, 15). In contrast, BCC occurs due to intermittent sunlight exposure (1-3, 15) and history of sunburns (2), especially during childhood and adolescence (1, 2, 8). Most of the evaluated patients (18/25) reported exposure to UV radiation since childhood in a chronic form. During clinic visits, both pre and postoperatively, 18 (72%) of 25 patients suspected of NMSC reported more than five previous episodes of burns resulting from exposure to sunlight. Exposure to solar radiation is usually measured through the categorization of exposure (recreational or professional) (5, 6). According to a recent study (17), the risk of developing NMSC is substantially higher for both sexes among outdoor workers in comparison with indoor workers not directly exposed to UV radiation. The vast majority of patients in this study were farmers and rural residents, similar to what was reported in the literature concerning the environmental risk factors for developing NMSC (15, 17). Associated with sun exposure, other risk factors may influence the onset of NMSC (1, 2, 8, 9). In this series, there was a predominance of patients with phototypes I to III Fitzpatrick classes, consistent with the predominance of fair-skinned people in the study area due to the local colonization pattern (13). The risk of NMSC increases with age (5), and 80% of cases occur in people aged 60 or older (1), which is in accordance with the data presented here. Women were the majority among our patients. Although there are studies showing a higher risk of NMSC development for men (5), there are others (10, 18) that corroborate this paper and show a higher NMSC incidence in women.

Currently, the increasing rates of BCC in young people, especially women (3), and the association between risk factors, mainly in young white people with lower educational levels (19) cause great concern. In this study, a 34-year-old patient showed a progressively growing lesion in the left frontal region, with a diagnosis of BCC confirmed by the anatomopathological examination, and after one year, she returned during the follow-up presenting a new lesion also located in the left frontal region. She reported that, for several years, kept the skin tanned by applying cooking oil all over the body during sun exposure, which occurred mainly at times of increased UV radiation. Tanning artificial sessions, also

known as a high risk factor for developing NMSC (19), were reported during this same period.

There is a relationship between smoking and SCC of the lower lip and between chronic skin lesions and SCC (9). None of the patients presented SCC in areas of previous chronic lesions, but a 74-year-old patient showed a moderately differentiated SCC, with more than five centimeters length, relapsing in the thenar region of his left hand. This patient stated smoking a pipe for more than 60 years holding it with his left hand; probably the lesion was caused by the contact of the pipe, with high temperatures in the reservoir of smoke, with the skin.

The presence of actinic keratosis and/or Bowen's disease (SCC in situ) increases the risk for NMSC, as these skin lesions may progress to malignancy (1, 4). In seven patients with clinical suspicion of NMSC, the final diagnosis, determined by pathological examination, was actinic keratosis, and because they are in risk of developing NMSC they were given all the recommendations for photo-protection and regular self-examination of the skin. Due to the impact of NMSC in terms of public health (5), and because this is a potentially curable disease (4, 7), it is expected that doctors are able to accurately diagnose these skin lesions (15). Early diagnosis determines that the NMSC is rarely fatal (5-7), with survival rates close to 99% (6). Serious morbidities related to NMSC are often the result of the delayed diagnosis (7).

A wide variety of technologies is available for the non-invasive diagnosis of NMSC (7). Many of these technologies can assist in the diagnostic accuracy (6), for example, good lightning and visual magnification of the examination field with a dermatoscope (8). However, clinical examination and histopathologic evaluation should not be substituted yet (1, 7). Incisional biopsy of the lesion, for suspicion of both BCC and SCC is indicated when there is diagnostic uncertainty (8, 9); it can be time consuming, costly and sometimes crippling and painful for the patient, not being justified in most cases (7). The accuracy of the NMSC clinical diagnosis is approximately 60.2% (20); in relation to BCC it ranges from 59% to 88.93% (18, 20-23) and for SCC it ranges from 25% to 67.4% (18, 20-23). The diagnostic accuracy presented in this study is within the variation observed in the literature for both BCC and SCC. In other studies, on the contrary of ours, the diagnostic accuracy for BCC is higher than for SCC (7, 21, 22).

In the present study, all clinical hypotheses of NMSC were determined by a single plastic surgeon. The diagnostic accuracy varies according to the experience and training of physicians (21). Diagnostic accuracy varies from 25% (general practitioner) to 89% (dermatologist), according to the specialization degree of the medical examiner and the sample analyzed (21). In a previous paper (23), dermatologists accurately diagnosed 59% and 39% cases of BCC and SCC, respectively. In another study (22), a plastic surgeon accurately diagnosed 70% of BCC and 25% of SCC.

It is important to highlight that, despite NMSC is a common disease (2) and early diagnosis is very important (7, 16), errors in diagnostic hypotheses occur fairly frequently, even when the patients are evaluated in a specialized center for the treatment of skin cancer (24). This fact implies the need for an improvement in medical training regarding these lesions (16, 24). Another important aspect is that high rates of false negatives and false positives can not be ignored (7). In this study, ten diagnoses were false-positive, accounting for 23.8% of the total formulated diagnostic hypotheses, what is below the percentages reported in other studies (22, 25) that reported that up to 40% of the cases of suspected malignant lesions may, indeed, be benign lesions (22). There are reports (25) in which skin lesions clinically diagnosed as BCC, after the pathological examination, were revealed as actinic keratosis (7.5%), Bowen's disease (6.4%) and SCC (5.7%); and that the suspicious SCC lesions were actually actinic keratosis (11.1%), Bowen's disease (3.1%) and BCC (43%) (25). In cases of diagnostic doubts or of suspicious lesions for malignancy, surgical intervention is needed to confirm the diagnosis by histopathology, which remains as the gold standard for NMSC diagnosis (1, 22). In this study, for most cases of the discordant anatomopathological diagnoses of the clinical hypotheses previously made, surgical excision was justified in cases of actinic keratosis since this is considered as a pre-malignant lesion with indication for resection (16, 25).

One of the lesions which led to diagnostic disagreement occurred in one patient who had been referred for evaluation of a nasal lesion, which arose after she had undergone prior excision biopsy with anatomopathological diagnosis of SCC. This patient underwent further surgical excision and it was found no evidence of neoplasia in the examined surgical piece. Here it is possible that the diagnostic accuracy of anatomopathological examinations has exerted some influence on the outcome of clinical diagnostic accuracy (22), since the histopathologic examinations were carried out by different doctors after two separate surgeries. There are situations where there is disagreement between the anatomopathological diagnoses provided by two different experts (22) and, in general, differences between observers can not be overlooked as a potential source of misdiagnosis and choice of treatments (7).

In the study presented here, as in another recently published one (16), the diagnostic accuracy varied according to the affected anatomical area of the body. In both studies, the diagnostic accuracy, when stratified by tumor site, was highest in places where lesions occur more frequently (16). It is feasible to assume that the behavior learned by doctors causes an excess of malignant lesions' diagnoses (BCC and SCC) at the respective locations of the body where they most commonly occur, and an underestimation of lesions in body sites where they are less frequent (16). The probability of NMSC cure is strongly correlated with the number of prognostic factors (8, 9). The presence or absence of these prognostic factors allows inferring whether individual lesions present low or high recurrence risk after treatment (8). Immunosuppression, inadequately excised lesions, recurrent or relapsed lesions, and lymph node involvement or distant metastases are important determinants of a worse prognosis (1, 8, 9).

Factors associated with poor prognosis for BCC include tumor type (morphoeic), lesion size (larger than five centimeters), visual definition of clinical margins (poorly defined lesions have a higher recurrence risk), deeper tumor, location (face lesions, especially around the eyes, nose and lips), histological sub-type (infiltrative or micro-nodular) and histological characteristics of aggression, such as perineural and/or perivascular involvement (1, 8).

In SCC cases, the factors associated with worse prognosis include tumor size (larger than two centimeters), location (low risk corresponds to areas exposed to sun, except the lips and ears – there is a greater risk in periorificial areas), SCC on areas of radio-dermatitis, scars from burns, ulcers and areas of chronic inflammation, histological sub-type (mucoepidermoid, acantholytic, desmoplastic), histological features of aggression (perineural invasion; degree of cytological differentiation: well differentiated/not well or undifferentiated) (1, 9).

According to clinical and histological criteria, the prognoses of patients with SCC can be classified into two groups (9): group 1 – SCC of very low risk, which are those that have no criterion for a poor prognosis; group 2 – SCC with significant risk of recurrence and/or metastasis, in which the presence of a single criterion is sufficient to classify the SCC in this group. Group 2 is very heterogeneous in terms of prognosis, since the risks posed by each of the prognostic criteria are variable, and the association of several independent criteria increases the risk (9).

The primary goal of the NMSC treatment is the complete removal of the lesion (1, 18), and a cosmetically acceptable result is an important secondary objective (1). Unfortunately, in some situations the evolution of lesions and/or the surgical techniques can lead to poor cosmetic results. To ensure complete removal of NMSC, it is always the histological examination of surgical margins of the lesions (1), because surgical excision with safety margins free of neoplasia on histopathology is the main treatment goal (1, 8, 9, 26). The therapeutic option adopted in all cases of this study was the surgical resection of lesions with adequate safety margins.

In the evaluation of NMSC surgical treatment, the rate of incomplete removal is a useful indicator of clinical performance and effectiveness, since it is related to the cure rates and relapse and eventually it interferes with morbidity and mortality and also with the total financial cost of the treatment (26). It is well known that the probability of NMSC relapse is directly related to the adequacy of surgical excision (22). Relevant factors associated with incomplete excision include the surgeon's experience, the anatomical affected site, the sub-type of the lesion, and the excision of multiple tumors during the same surgical procedure (8). The extent of surgical excision margins ranges from 2 to 5 mm for BCC (8) and can reach up to 15 mm for SCC (18), depending on different criteria adopted by specialty professional organizations in different countries (1).

Surgical excision with safety margins is the preferred treatment for low and high risk BCC (8), with rates of complete excision close to 98% (18, 27) and with recurrence rates of less than 2% in five years after the complete histological excision (8). The lateral margins of excision for primary well-defined BCC should be approximately four millimeters beyond the clinically apparent margins of the lesion (8). The treatment of the large

and/or morphoeic BCC is an exception and requires margins with 13 to 15 mm in order to obtain similar rates of treatment success (1, 8, 26). The determination of deep surgical margins depends on the local anatomy and the excision by subcutaneous fat is the minimum recommended treatment (8).

A major problem in the surgical treatment of BCC is the eventual finding of positive surgical margins, on histopathologic examinations, of excised lesions; because histological evidence of residual neoplasia (BCC) on the margins of the surgical specimen, by itself, does not necessarily predict the risk of recurrence and vice versa (28). In the lesions with anatomopathological diagnosis of BCC evaluated in this study, no compromised margin of surgical excision was observed. In the literature, incomplete excision, where one or more surgical margins are compromised by the tumor (BCC), ranges from 1.54% to 13.7% of the reported cases (26). Following incomplete histological excision of BCC, the recurrence rates vary from 19% to 100% (18, 28) and this risk is directly related to the adequacy of surgical excision (18). The greatest recurrence risks occur in lesions in which surgical excision margins (lateral and/or deep) are compromised by the BCC or when the incomplete excision was performed to remove a recurrent BCC, and especially in those tumors caused by radiation therapy (8).

Although there is no consensus on the best decision before a histological examination that shows positive margins in BCC (incomplete excision) (28), there is evidence (8) that support a policy of re-excision for these cases when the lesions involve anatomical sites of greater relevance, such as the face; when the surgical defect was repaired flaps; or when the histological analysis shows an aggressive histological subtype (8). For the treatment of recurrent BCC, it is usually required surgical margins of peripheral excision greater than those used to remove the primary lesion, and it is suggested margins of 5 to 10 mm (8).

In cases of SCC, since there is a greater risk of metastasis recurrence (9), it is important that before the surgery, a patient's initial assessment characterizes the loco-regional extent of the lesion and the commitment at distance (9). Clinical examination should include inspection of all skin for the detection of other lesions and palpation of lymph nodes of preferred draining in the affected anatomical region (9). For primary low risk SCC (group 1), further examinations are not justified. As for

the primary SCC with a significant risk of recurrence or metastases (group 2), in addition to careful clinical examination, a loco-regional ultrasound examination can be carried out for the investigation of metastases (9).

The surgical excision with adequate safety margins is the treatment of choice for most cases of SCC (9). Lateral surgical safety margins should be four millimeters for lesions smaller than two centimeters (9, 26); and larger than six millimeters for primary lesions with more than two centimeters (9), or for high risk lesions (group 2) (1, 9, 26). In relation to the deep margins, surgical excision should involve the hypo-dermis, respecting fascia, periosteum and perichondrium, since these structures are not in contact with or invaded by the tumor (9).

In different series, the percentage of surgical margins compromised by SCC ranges from 3.9% to 15% (22, 26), with a recurrence rate ranging from 4% to 50% of the cases (20). According to a recent guideline (9), if the surgical margins are compromised by SCC (incomplete excision), it is essential the re-excision with a 4-6 mm safety margin, and if this is not feasible, adjuvant treatment (radiotherapy or chemotherapy) may be an acceptable option (9). In the study presented here, there was only one SCC case with one of the lateral excision margins committed, and local recurrence in a patient with an extensive primary SCC larger than 5 centimeters in the palm of his left hand. Initially, the procedure for this patient was the clinical follow-up, since the patient had high surgical risk and there were no clinical signs of relapse. Twenty two months after the first surgery there was evidence of lesion recurrence in the left hand. The lesion was excised again with surgical margins and adequate security, and after the recurrence confirmation on the histopathologic examination, the patient was referred to radiotherapy.

There seems to be no consensus on the length of postoperative follow-up for NMSC patients (9, 29). However, the possibility of recurrence (8, 9), the appearance of new malignant skin tumors (4, 5, 10) and increased risk of developing metastases in SCC (9) are strong arguments for the monitoring of individuals for long periods, preferably by someone who has experience in treating skin cancer (22).

In this study, nine patients were operated with suspects of ten new NMSC lesions (Table 7). The average follow-up was 19.75 months. The hypotheses of new NMSC were confirmed by histological examinations in nine of

these cases. In three years of follow-up, the risk of a SCC patient to develop a new SCC is approximately 18% (10); and for a BCC patient, the risk of a new BCC is approximately 44% (10).

There is no consensus on the follow-up length of patients treated for NMSC (9, 29), nor on the intervals between appointments in the period of postoperative follow-up, but it is recommended that follow-up time be a minimum of three years (8). For patients with SCC, in high-risk cases (group 2), the clinical examination must be interleaved every 3-6 months and a loco-regional ultrasound examination of the draining anatomic area of drainage is recommended every six months for a follow-up period of five years (9). All patients should be trained to perform skin self-examination and advised on protection (prevention) against UV radiation (8, 9). In our service, all cases with NMSC histopathologic confirmation are followed closely by an average of 24 months, and then they are referred to follow-up at basic health services.

The incidence of NMSC continues to increase (1), which will imply in a large impact on the financial costs (5, 15), becoming a major challenge in terms of public health management (5). Effective prevention is an urgent demand (15), because through it, it may be possible to halt the increase in incidence rates (4) and to reduce the financial costs (2, 5) and the morbidity (1, 5) of this type of cancer, considered as one of the most responsive types to preventive measures (15).

Many experts believe that 80% of skin cancers could be avoided by implementing protective measures (4, 6) against exposure to solar radiation, such as limiting sun exposure during certain times (10:00 a.m. to 4:00 p.m.), dressing with clothes that cover as much skin as possible, wear wide-brimmed hats to protect your neck, wear sunglasses, apply sunscreen, drink plenty of water and examine the skin regularly (4, 6, 30).

Several governments and health organizations have launched prevention programs warning that excessive exposure to sunlight is the most important pathogenic factor for the onset of NMSC (1). However, the increase in the incidence of NMSC (1, 2, 4, 5) may indicate that primary prevention measures are failing or are insufficient, or that it is too early to assess their effectiveness (2). It is important to consider that the results of prevention depend not only on the effectiveness of the strategy itself, but also on the acceptance and intro-

duction of the protective measures among people at risk (15). The results of some studies indicate that the vast majority of adults do not regularly adopt protective measures against sun exposure (19, 30).

As reported here, other studies also showed that the majority of workers who carry out outdoor activities do not use proper sun protection (15). Unlike what was observed in this study, some studies were able to improve the acceptance and implementation of measures for sun protection after treatment of NMSC in population groups at risk (15). There are possibilities for improvement in the sun protection behavior and working conditions of workers at risk (15). The previous diagnosis of skin cancer may motivate individuals who work outdoors to take precautions against sun exposure, but these groups can not limit their sun exposure time and so, there is the need for action by employers, such as limiting or minimizing workers' exposure to the sun during times of peak UV radiation (from 10:00 a.m. to 04:00 p.m.), whenever possible (15).

Important and relatively unknown aspects are the perceptions of risk and preventive behaviors for patients with personal history of NMSC (10). Some studies have shown that preventive measures can reduce the risk of new lesions in these patients (10, 15). The fear of developing cancers in the future and the effects of disease and/or of its treatment in social interactions, and in the perception of body image can motivate patients to adopt strategies for primary prevention of cancer, such as sun protection behaviors, stop smoking and improve diet (10).

Twelve of the patients in this study, who had an NMSC diagnosis confirmed by anatomopathological examination, even being aware of the prevention methods after having been treated surgically, protected themselves in no time by following the methods taught; the other eight patients with confirmed NMSC diagnosis started to make some sporadic and irregular use of prevention methods. Apparently, the diagnosis of NMSC and the fact that these patients had undergone surgical excision of the lesions did not affect the adoption of preventive measures and/or changes in sun exposure habits, contradicting reports from other studies (10). Programs for the adoption of preventive measures against sun exposure should be promoted primarily during childhood and adolescence because during these phases they are more effective and of easier assimilation (31, 33). Our study

was limited to a specific selected demographic population, with predominance of fair-skinned individuals and it can not be extrapolated to more diversified populations regarding other photo-types.

In conclusion, the accuracy of clinical diagnosis for NMSC, when compared with the results of anatomo-pathological examinations, was considered satisfactory. The surgical treatment with predetermined safety margins was effective in most cases. The diagnosis and the surgical treatment have not determined a positive impact on the adoption of preventive measures for NMSC.

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