

ORIGINAL ARTICLE

The management of locally advanced head and neck squamous and basal cell carcinomas

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Summary

Purpose: The management of locally advanced head and neck basal (BCC) and squamous cell (SCC) carcinomas has been controversial and often debated. The purpose of the current study was to present our experience in the treatment of non-melanotic head and neck skin malignancies.

Methods: From 2000 to 2017, 34 patients with locally advanced head and neck skin tumors were treated in our hospital with wide local excision and immediate reconstruction mainly with rotational flaps, free tissue transfers and skin grafting.

Results: Histopathological examination revealed 10 BCCs, 22 SCCs and 2 cases of metatypical basal cell carcinomas.

All patients were successfully submitted to ablative procedure with minimal morbidity and acceptable cosmetic results.

Conclusions: Locally advanced head and neck SCCs and BCCs are large tumors that may invade adjacent structures or infiltrate into deep tissues. Complex reconstructive methods are needed to close the defect, with free tissue transferring being a reliable option. Finding clear margins is crucial in order to prevent unnecessary morbidity and local recurrence.

Key words: bone invasion, free tissue transfer, head and neck, locally advanced, non-melanotic, skin malignancies

Introduction

BCC is the most common skin malignancy and SCC is the second most common type of skin cancer. Both of these types of skin cancer develop more frequently to individuals with light complexion, who had previously been exposed to sunlight for long periods of time [1]. The stage of disease and the type of treatment applied directly affect cure rates of these cancers and patient survival. Localized BCCs and SCCs of the skin are both highly curable by simple excision and radiation therapy. Alternative methods include the use of curettage, electrodesiccation and cryosurgery.

Skin head and neck malignant tumors enlarge progressively and often spread to the regional lymph nodes. Recurrent lesions usually invade adjacent structures rather than giving distant metastasis. Aggressive resection of locally advanced head and neck BCCs and SCCs and reconstruction with free tissue transfer are valid options for treating many patients [2].

The operation often requires the collaboration of a microsurgical reconstructive surgeon and a maxillofacial surgeon with knowledge of head and neck anatomy. Chang et al. [3] reported 77% overall

survival at 2 years and 58% at 4 years after aggressive resection of tumors infiltrating the calvarium.

The purpose of the current study was to present our experience in the management of locally advanced skin head and neck cancers and reconstruction of complex defects, mainly with free flaps, pedicled flaps and skin grafting. For scalp defects giant rotational flaps and free tissue transfer have been used with polymethyl-methacrylate material being the standard approach for cranioplasty.

Patient characteristics, tumor size and location, recurrence and metastasis, type of reconstruction and complications are presented for 34 patients.

Methods

From 2000 to 2017 we treated 34 patients with locally advanced skin head and neck tumors at "Agios Savvas" Oncologic Institute, Athens, Greece. All patients were submitted to wide local excision combined

Table 1. Staging of American Joint Committee on Cancer (AJCC) TNM Staging Classification for Cutaneous Squamous Cell Carcinoma of the Head and Neck (8th Edn, 2016)

Primary tumor (T)			
TX	Primary tumor cannot be assessed		
Tis	Carcinoma <i>in situ</i>		
T1	Tumor smaller than 2 cm in greatest dimension		
T2	Tumor 2 cm or larger, but smaller than 4 cm in greatest dimension		
T3	Tumor 4 cm or larger in maximum dimension or minor bone erosion or perineural invasion or deep invasion		
T4	Tumor with gross cortical bone / marrow, skull base invasion and / or skull base foramen invasion		
T4a	Tumor with gross cortical bone / marrow invasion		
T4b	Tumor with skull base invasion and / or skull base foramen involvement		
Regional lymph node (N), Clinical N (cN)			
NX	Regional lymph nodes cannot be assessed		
N0	No regional lymph node metastasis		
N1	Metastasis in a single ipsilateral lymph node, 3 cm or smaller in greatest dimension and ENE(-)		
N2	Metastasis in a single ipsilateral node larger than 3 cm but not larger than 6 cm in greatest dimension and ENE(-); or metastases in multiple ipsilateral lymph nodes, none larger than 6 cm in greatest dimension and ENE(-); or in metastasis in bilateral or contralateral lymph nodes, none larger than 6 cm in greatest dimension and ENE(-)		
N2a	Metastasis in a single ipsilateral node larger than 3 cm but not larger than 6 cm in greatest dimension and ENE(-)		
N2b	Metastasis in multiple ipsilateral nodes, none larger than 6 cm in greatest dimension and ENE(-)		
N2c	Metastasis in bilateral or contralateral lymph nodes, none larger than 6 cm in greatest dimension and ENE(-)		
N3	Metastasis in a lymph node larger than 6 cm in greatest dimension and ENE(-); or metastasis in any node(s) and clinically overt ENE [ENE(+)]		
N3a	Metastasis in a lymph node larger than 6 cm in greatest dimension and ENE(-)		
N3b	Metastasis in any node(s) and ENE(+)		
Distant metastasis (M)			
M0	No distant metastasis		
M1	Distant metastasis		
Prognostic stage groups			
Tis	N0	M0	0
T1	N0	M0	I
T2	N0	M0	II
T3	N0	M0	III
T1	N1	M0	III
T2	N1	M0	III
T3	N1	M0	III
T1	N2	M0	IV
T2	N2	M0	IV
T3	N2	M0	IV
Any T	N3	M0	IV
T4	Any N	M0	IV
Any T	Any N	M1	IV

ENE: extranodal extension. Clinical and pathological extranodal extension is recorded as ENE(-) or ENE (+)

with adequate reconstruction. Scalp reconstruction was accomplished using giant rotational scalp flaps or microvascular techniques where needed. Pedicled flaps were used mainly for neck and maxilla reconstructions.

Preoperative evaluation

All patients were submitted to preoperative exams including history and physical examination, laboratory tests, chest X-ray and visceral cranium-neck CT. MRI was ordered to detect brain invasion. The stage of disease was defined with the AJCC classification (Table 1 for SCC).

Surgery

Xylocaine – adrenaline 1% solution was injected circumferentially around the tumor. Wide local excision of the tumor with 2 cm surgical margin was performed combined with underlying craniectomy and dural resection for scalp tumors if needed. Curettage of the surface of the skull bone was performed for partial thickness cranium invasion without any reconstruction. In the case of full thickness defects of the cranium, reconstruction was completed using a fascial graft (fascia lata in most cases) for the dura and methyl methacrylate mesh for the skull. In case of invasion of the parotid gland, total parotidectomy was performed, preserving the facial

nerve, followed by lymph node dissection of the neck. External soft tissue closure of the defects was performed with giant rotational flaps, temporal artery flap, major pectoralis and latissimus dorsi pedicled flaps, and free tissue transfer.

Postoperative care

Postoperatively, patients were transferred to the Intensive Care Unit with IV fluids and antibiotics, anti seizure medication (Epanutin) where needed, support of the respiratory and cardiovascular system and low molecular weight heparin. After stabilization they were transferred to the clinic and after hospitalization for one or two weeks they were discharged from hospital.

Follow-up

After the treatment for locally advanced BCCs and SCCs of the head and the neck, every patient was clinically examined every three months for the first and the second years for early diagnosis and treatment of recurrent disease. Thereafter, the patient should be examined once or twice every year.

Statistics

Due to the limited size of the sample (34 patients), statistical analysis wasn't performed.

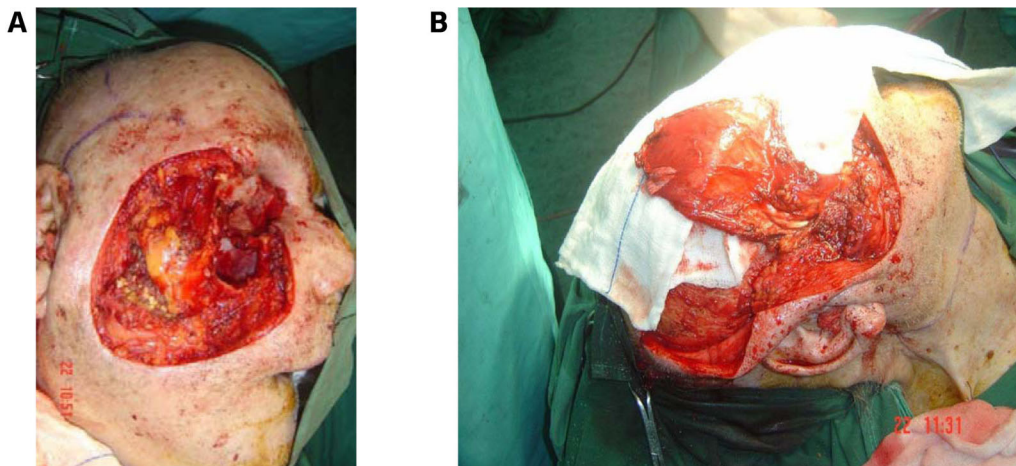


Figure 1. A: Recurrence of SCC of the right orbit. **B:** Right orbit excision and exenteration - Reconstruction with Temporalis.



Figure 2. A: BCC cheek recurrence - Dynamic reconstruction with Temporalis / Anterolateral thigh flap (ALT) / Vastus. **B:** ALT flap. **C:** Image after surgery.

Results

In our series, 34 patients (20 male and 14 female) with locally advanced head and neck skin tumors were treated and their cases were discussed at the Hospital's Oncologic Council. Their ages ranged from 34 to 88 years (mean 65). The tumor was located in the middle face in 19 cases, in the scalp in 11 and in the parotid-masseteric zone overlaying the middle cranial fossa in 4 cases. The histological examination revealed 10 cases BCC, 22 of SCC and 2 cases of metatypical basal cell carcinoma.

The surgical approach involved wide local excision of the tumor with minimum 2 cm safety margin, craniectomy and dural resection with 1 cm margin if bone and dura were involved, and lymph node neck dissection mostly for SCCs. Dural repair was accomplished mainly with fascia lata. Polymethylmethacrylate polymer was used for coverage in all patients with a craniectomy defect. Giant rotational scalp flap was used in 10 patients. Subtotal superior maxillectomy was performed in 9 patients, scalp excision combined with craniectomy in 6, superior maxillectomy with rhinotomy in 4, total superior maxillectomy in 4 and total extend-

ed parotidectomy combined with lithoideotomy in 4. Full thickness cranium resection and dura repair were needed for 2 patients. Large bony defects were reconstructed with polymethylmethacrylate. Free tissue transfer using rectus abdominis flap was used in 4 patients, radial bone flap in 2 and anterolateral thigh flap in 8 patients (Figures 2 and 3). Pedicled tissue transfer was held with temporalis in 6 cases (Figure 1), with dynamic temporalis and nerve graft in 2, with major pectoralis in 2 and with latissimus dorsi flap also in 2 cases. Free dermal graft was used in 6 patients (Figure 4c,d).

No major complications were observed. Two cases of partial loss of scalp flap were treated with surgical debridement and skin grafting. Two patients died of cardiologic complications. No incidents of infection and no cerebrospinal fluid (CSF) leak in this group of patients were observed. Most of the patients were subjected to postoperative radiation therapy. More specifically, 22 patients with SCC, 7 with BCC and 2 with metatypical BCC received postsurgical radiotherapy.

Follow-up showed that 20 patients were free of disease. All patients were followed-up for at least 5 years after the operation. The final date of follow-

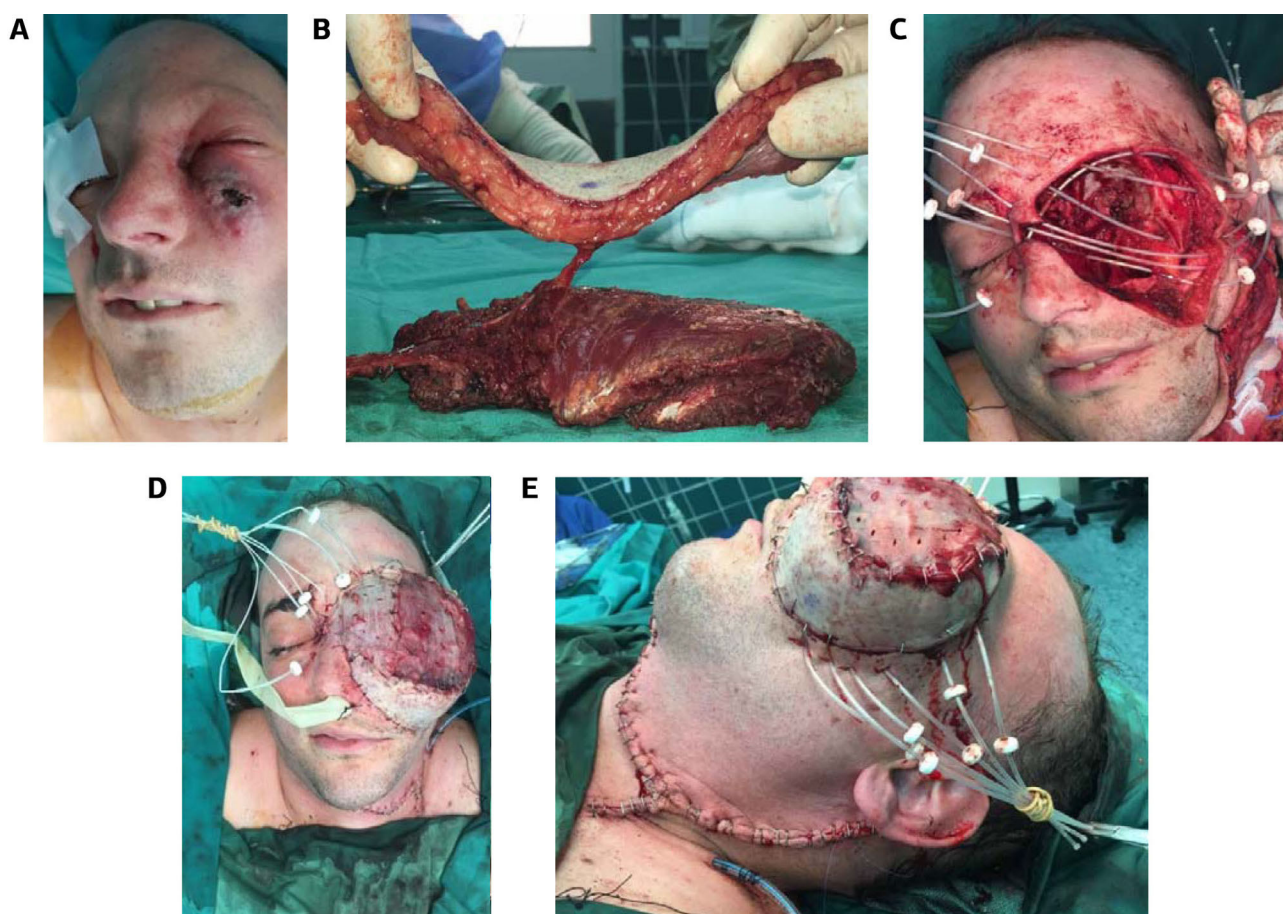


Figure 3. A: SCC recurrence of the left lacrimal sac. B: ALT and Vastus. C: Intrafacial undercranial approach. D, E: Reconstruction with ALT and Vastus.

up was the 28th November 2017. Nodal recurrence occurred in 4 patients treated with neck dissection. Local tumor recurrence occurred in 8 patients. All patients were satisfied with the results and all our cases were accompanied with significant cosmetic result improvement and better hygiene.

Discussion

Locally advanced head and neck BCCs and SCCs usually are large lesions that often infiltrate the pericranium and surrounding tissues and they are difficult to deal with. Automatically the reconstructive procedure becomes more complex. A skin graft cannot survive over the “naked” bone without the pericranium, because the blood supply is poor. The basic pedicled flaps that have been used for head and neck reconstruction are the pectoralis major, the latissimus dorsi and the trapezius [4]. Although neck and occipital defects can be safely closed with any of these flaps, defects more superiorly on the skull cannot be safely reached with these flaps [5].

The large size of the tumor and the invasion of the underlying structures are factors that directly affect metastatic potential. Metastasis however in

BCCs occurs rarely [6]. On the other hand, cutaneous SCCs have the risk of spreading to the lymph nodes [7]. None of our patients developed distant metastasis. The presence of metastasis has always a negative impact on survival [8].

Reconstruction options in head and neck skin carcinomas are determined mainly according to the size and the location of the resulting defect. For external soft tissue closure free flaps are considered to be the first and safest choice in most of the cases. Microsurgical reconstruction is a reliable option for closure complex defects with well vascularized tissue, especially when tissues are scarred or previously radiated [9]. The anterolateral thigh flap is an ideal choice, particularly for thin patients, because of its minimal donor-site morbidity and long pedicle length (Figures 2b,3b). For total scalp coverage the latissimus dorsi free flap usually combined with skin grafting is often a good choice [10]. Alternatives such as the rectus abdominis and the radial forearm flap are limited for smaller sized defects [11]. In our series we have used rectus abdominis free flap in 4 and radial forearm free flap in 2 patients. We haven't used latissimus dorsi free flap in any patient.

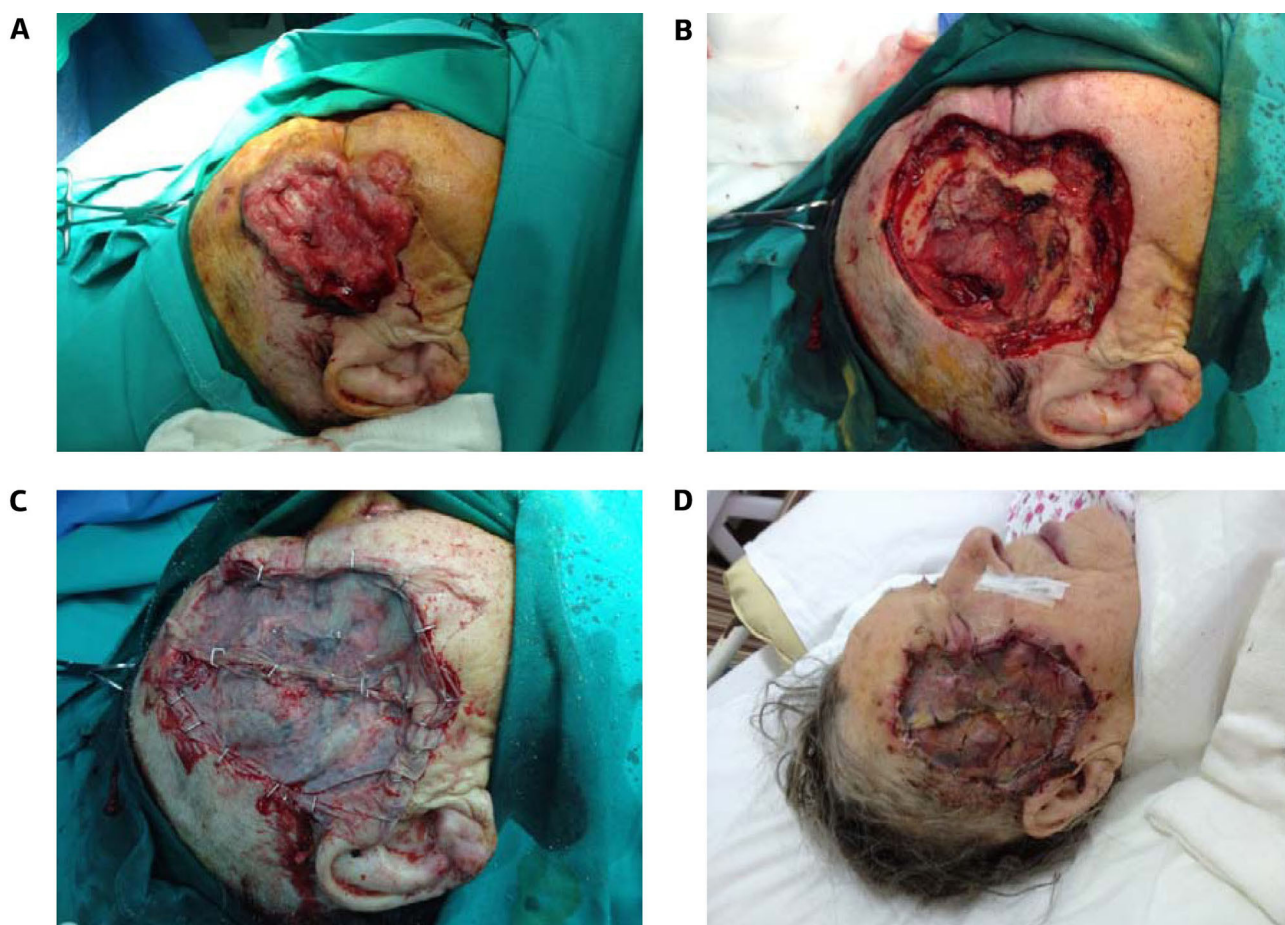


Figure 4. A: SCC of the right temporal area. B: Wide local excision. C: Reconstruction with skin graft. D: Image after surgery.

Regarding our cases of free flap reconstruction of the scalp, we found that the anterolateral thigh flap provided generous amounts of fascia lata required for dural repair [12]. We also believe that the free latissimus dorsi myocutaneous flap is a reliable flap with good vascularity that allows the coverage of the whole scalp if needed.

However, reconstruction with microsurgery is not always preferable because of many reasons, such as advanced age of the patient and additional problems that increase the risk of complications during anesthesia. In these cases we use scalp, local or pedicled flaps for adequate closure. The advantages of scalp flaps are that they provide repair with similar textures and the operative time is rather short, but they often result in dog ear deformity. The skin grafts are an easy option for closure of the donor area but they don't always provide sufficient volume [13]. On the other hand, trapezius myocutaneous pedicled flap is always a good solution for occipital defects. In our series, we also used temporalis flap in 6 cases, temporalis and nerve grafts in 2, major pectoralis flap in 2 and latissimus dorsi also in 2 cases. In our opinion, major pectoralis and latissimus dorsi pedicled flaps provide a long pedicle especially for adequate neck closure.

In our series most of the patients had locally advanced tumors (T3 and T4). Lymph nodes were positive in 12 cases. Locally advanced head and neck SCCs tend to be lymph node-positive at the time of diagnosis. That's why we used to perform simultaneous neck dissection for all cases of locally advanced SCCs and to give radiation therapy after the completion of surgical treatment. Reconstruction by free myocutaneous flaps was performed with microsurgical techniques and flap harvesting began at the same time with the excisional procedure. Dural repair was accomplished with the fascia lata and rotational scalp flaps were very reliable, providing enough tissue for the coverage of complex scalp defects.

Calvarian reconstruction depends significantly on the size of the defect. A full-thickness calvarian bone flap harvested mainly from the parietal region where the skull is thickest, using an osteotome and placed in the bone defect, is most suitable for small defects. Other autologous materials include the iliac crest and split rib bone grafts, which are used as nonvascularized free grafts. Vascularized versions of calvarian or rib grafts are often used to restore an irradiated recipient bed or when infection is present. On the other hand syn-

thetic materials such as polymers could be used for cranioplasty when the defect is large or when autologous material is not available [14]. In our series we used polymethyl methacrylate polymer to restore the contour of the skull and protect the brain. Coverage of this material by well-vascularised tissues is very important in order to prevent infection and meningitis [15].

Osseous reconstruction of the maxilla using a vascularised free fibula flap is our method of choice for this type of reconstruction. For mandible reconstruction the single cutaneous perforator-based fibula osseocutaneous flap and the radial forearm free flap are the options most used [16]. Skull base is usually reconstructed by the use of a big variety of myocutaneous free flaps including the combination of ALT (anterolateral thigh flap)/Vastus, the rectus abdominis and the latissimus dorsi flaps [17]. All of these myocutaneous flaps have the advantage of providing generous amounts of skin, subcutaneous fat, muscle and fascia and all of them attribute to of a long vascular pedicle.

Recurrence rates after treatment of locally advanced head and neck BCCs have been low in most studies. Overall, the 5-year recurrence rates for all types of BCCs treated by excision and immediate reconstruction are 8,7% [18]. Before surgery, patients with head and neck tumors had difficulties with pain and bad hygiene because of secretions and odor from the tumor [18]. Relief of pain and better hygiene postoperatively had a positive impact on patients' psychology and social function and that fact resulted in improved quality of life.

Conclusion

We believe that microsurgical reconstruction is a valid option for providing reliable coverage of large complex head and neck defects. Free tissue transfer is the method of choice for reconstructing major defects, but still pedicled flaps play an important role. Also the autogenous and alloplastic materials used for cranioplasty provide excellent calvarian reconstruction with low infection potential and good contouring. In our opinion, wide local excision, immediate reconstruction and post-operative radiotherapy is the treatment of choice for locally advanced head and neck BCCs and SCCs.

Conflict of interests

The authors declare no conflict of interests.

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