

TO THE PROBLEM OF SURGICAL TREATMENT OF EYELID CANCER

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The abstract.

Eyelid tumours represent a serious problem in view of their anatomic proximity to the eye, brain and appendicular sinuses. In the works of different authors frequency of eyelid tumours varies depending upon the geographical zones, social and economic characteristics of the population. Malignant tumours range from 10 to 24 % of all eyelid neoplasms [18]. A surgical method of treatment that is the local excision with the following eyelid plasty has, perhaps, the greatest number of supporters [17; 19; 1; 4; 7]. In the Russian Eye and Plastic Surgery Center of Health Ministry of the Russian Federation with the purpose of one-stage eyelid restoration after its resection, the Alloplant biomaterials and tendinous sutures of the same series have well recommended themselves and are applied for eyelid plasty [11; 16; 5]. With the given technique we have operated on 151 patients with basal cell eyelid cancer. The follow-ups were estimated during a term of more than one year. The functional follow-up of the operations was estimated as good in 148 patients (98 %), as satisfactory - in 3 patients (2 %). The cosmetic follow-up of the operation was estimated as good in all patients. Recurrences of the basal cell cancer during the period of supervision have not been revealed. The Alloplant biomaterials can be successfully used with the purpose of the creation of an eyelid skeleton and its strong fixing in case of the plastic reconstruction after a partial penetrating eyelid resection . This excludes the necessity for application of the traumatic and multistage surgical procedures on taking the autogenous tissues. The possibility of one-stage eyelid reconstruction allows to carry out surgical treatments of the eyelid cancer more considerably.

Key words: Alloplant biomaterial , eyelid cancer, surgical treatment, penetrating eyelid resection, autoalloplasty.

Eyelid tumours represent a serious problem due to their anatomic proximity to the eye, brain and appendicular sinuses. In the works of different authors frequency of eyelid tumours varies depending upon the geographical zones, social and economic characteristics of the population. Malignant tumours range from 10 to 24 % of all eyelid neoplasms [18].

Depending on the source of the tumour development, basal cell cancer, epidermoid carcinoma or adenocarcinoma of the meibomian gland, eyelid skin melanoma are pointed out.

The most widespread morphological form of the eyelid cancer is the basal cell cancer, its frequency varies from 80 to 90 % of all eyelid cancer cases [24; 30]. The epidermoid cancer occurs much more seldom than the basal cell cancer and makes up 15-18 % of all eyelid tumours [28]. It affects mainly senior persons with the skin sensitive to insolation [34]. The prognosis of this kind of cancer is considerably worse, than in cases of the basal cell carcinoma since the tumour is characterized by rather an aggressive and invasive growth.

In modern literature there is quite a lot of the methods to treat carcinoma of the skin: radiation therapy, surgical excision, cryodestruction, electrocoagulation, laser therapy and chemical therapy [9; 25]. The surgical method of treatment - local excision with the subsequent eyelid plasty - has, perhaps, the greatest number of supporters [17; 19; 1; 4; 7].

The idea of the existing methods of the eyelid defects replacement after the excision of the tumour consists either of the creation of a derma-mucous duplication, or of derma-cartilaginous or muco-cartilaginous allografts transplantation. [2; 3; 8; 13; 14; 15; 29; 21; 10; 26; 23; 7; 4; 27]. However in this case the eyelid skeleton holding it in the physiologically correct position is either not restored, or there is a necessity in causing an additional trauma [10; 26; 23; 7; 4; 27].

In our opinion, the use of the allogenic grafts can be one of the ways to achieve optimum combination of cosmetic and functional results in regenerative eyelid surgery. This question of the allogenic transplants usage in eye oncology was reported by such specialists as Dunaevskij V.A. (1976); So11 (1976); and Crawford (1969); Rubin PA et al, (1999); Shorr N, Perry JD, Golberg RA, Hoenig J, Shorr J. (2000).

In the Russian Eye and Plastic Surgery Center of the Health Ministry of the Russian Federation with the purpose of the one-stage eyelid restoration after its resection, the Alloplant biomaterials and tendinous sutures of the same firm have well recommended themselves and are well applied for eyelid plasty[11; 16; 5].

Materials and methods

The allograft characteristics.

The transplant used for skeleton plasty is a connective- tissular formation with the fibrous structures as its basis. This skeleton consists of the bundles of densely packed collagenic and elastic fibres dipped into the basic substance.

One surface of the given allograft (rough) has the ability to be well vascularized, the second (smooth) – intensively epithelialized.

The clinical characteristics of patients with eyelid tumours .

We have operated on 151 patients with partial eyelid defects .

The average age of the patients made up $62,1 \pm 0,68$ years (Table 1).

Table 1. Age characteristic of patients

The age (years)	31-40	41-50	51-60	61and older
Number of patients	3(2%)	14 (9,3%)	82 (54,3%)	52(34 , 4%)

As it is seen from the table, more than half (88,7 %) of the patients make a senior age group (51 years and older), 65,6 % of the people are able-bodied (till 60 years). The diagnosis revealed the basal cell cancer in all (100 %) patients. An upper eyelid lesion was observed in 24 patients (15,9 %), lower eyelid lesion - in 127 (84,1 %).

This is the distribution of the newly formed tissue localization depending on the defected area:

Internal 1/3 upper eyelid - 13 (8,6 %)

Medial 1/3 upper eyelid - 7 (4,6 %)

External 1/3 upper eyelid - 4 (2,6 %)

Internal 1/3 lower eyelid - 43 (28,5 %)

Medial 1/3 lower eyelid - 52 (34,5 %)

External 1/3 lower eyelid - 32 (21,2 %)

The distribution of patients defined by the level of the tumoural process (T, according to the TNM classification) is shown in Table 2.

Table 2. The distribution of patients defined by the tumoured area (T, according to the TMM classification)

Affected area	T1	T2
Number of patients	44 (29,1%)	107 (70,9 %)

The affection of the regional lymphatic glands (N, according to TNM classification) and the remote metastases (M, it agrees with TNM classifications) were not observed.

A partial penetrating eyelid resection with primary alloautoplasty has been carried out on all patients. The results were followed-up with the range of 6 months to 21 years.

We have worked out the following kinds of operations:

- Partial penetrating resection of the external third of the upper eyelid with one-stage alloautoplasty;
- Partial penetrating resection of the medial third of the upper eyelid with one-stage alloautoplasty;
- Partial penetrating resection of the internal third of the upper eyelid with one-stage alloautoplasty;
- Partial penetrating resection of the internal third of the lower eyelid with one-stage alloautoplasty;
- Partial penetrating resection of the medial third of the lower eyelid with one-stage alloautoplasty;
- Partial penetrating resection of the external third of the lower eyelid with one-stage alloautoplasty.

The operative technique of the partial penetrating resection of the external third of the upper eyelid with one-stage alloautoplasty.

The tumour localization of in the external third of the upper eyelid purely occurred only in one case, but with the external angle affection of both eyelids there were 10 cases of the kind.

The operational field preparation was carried out according to the standard technique, anesthesia - as a rule , is local, but if indicated the general narcosis was given. The eyelid was placed on bridle suture-holders which at the same time marked the borderline of the tumour dissection. A penetrating resection of the upper eyelid was performed at least 4mm from the visible tumour edge under the control of the operational microscope; the hemostasis was carried out by the electroforceps (Fig. 1 a). The skin incision was continued on the temporal area and was separated from the nearby tissues with the following careful hemostasis with the use of the hemostatic sponge or drape with a hot physiological solution. An eyelid cartilage replacement was performed with the allograft, turned with its smooth surface towards the eyeball which was very carefully sutured to the stumps of the eyelid with allotendinous sutures. The size of the allograft from the edge of the dissected eyelid was 2-3mm less than the dissected area, so that the post-plastic eyelid was in the tense position (Fig. 1 b). For the skin defect replacement a method of lateral skin sliding from the temporal areas according to Imra with the Burov's triangle dissection in E.R.Muldashev's modification (copyright № 919 666). In the past few years we perform skin plasty without the dissection of skin triangles. The complete view of the operation is given in the scheme (Fig. 1 c). In follow-up, sutures are, as a rule, gentle and only the absence of the eyelashes in the external part of the upper eyelid gives signs of the operation.

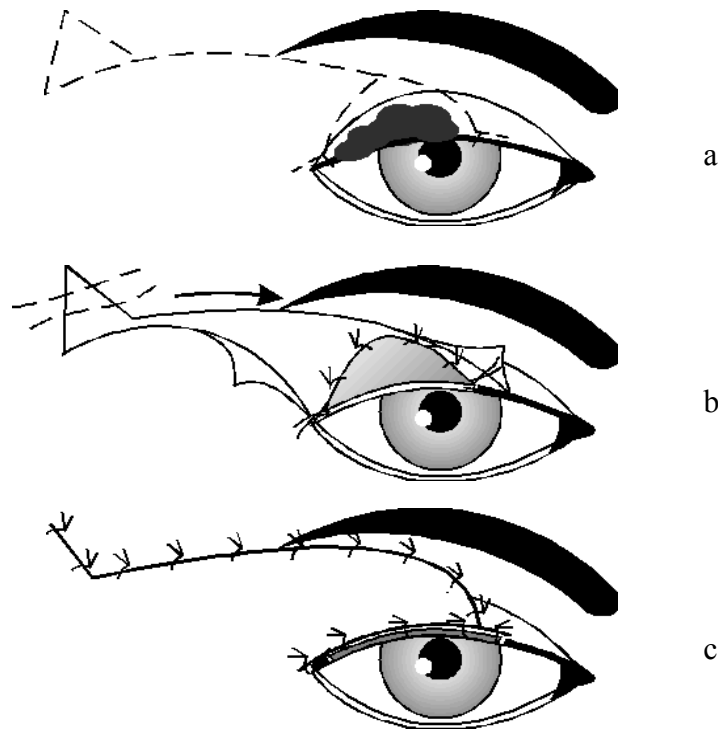


Fig. 1. The scheme of the partial penetrating resection of the external third of the upper eyelid with one-stage alloautoplasty.

a) Dissection borderline of the upper eyelid and a line of skin incisions

b) Replacement of the eyelid tarsus defect with an allograft and direction of the skin displacement

c) Complete view of the operation

The operative technique of the partial penetrating resection of the medial third of the upper eyelid with one-stage alloautoplasty.

The tumour localization in the medial third of the upper eyelid occurred in 11 cases, all patients were successfully operated on.

The eyelid was placed on the bridle suture-holders which marked the borders of the tumour dissection (Fig. 2 a). An eyelid penetrating resection was carried under the control of the operational microscope. Starting from the upper edge of the skin defect, moving down along the eyebrow toward the temple an arched skin incision was made where the triangle as per Burov was cut out and dissected. The skin was separated from the surrounding tissues bluntly as far as possible, for that the scissors with strong branches were used. A careful hemostasis with the use of the electroforceps for big vessels was performed, and for the fine ones, a hemostatic sponge or drape was applied with a hot physiological solution.

An eyelid cartilage replacement was performed with the alloautograft, turned with its smooth surface toward the eyeball, which was very carefully sutured to the eyelid stumps with allotendinous sutures dipped into the tissues. That was the way a marginal eyelid edge was formed. All along the rest the allotransplant was fixed with continuous or interrupted allotendinous sutures. The size of the allograft from the edge of the dissected eyelid was 2-3mm less than the dissected area, so that the post-plastic eyelid was in tense position (Fig. 2 b).

Whenever possible the remnants of the orbital muscles were sutured as far as possible to the allograft and the point of fixing of the damaged levator was by all means restored. The Burov's triangle in the field of the external angle of an eyebrow was taken in and sutured, then a lateral skin displacement was carried out. In the area of the eyelid edge, the displaced skin flap was fixed to the transplant with the silk sutures to prevent the cornea from being damaged with the sutural ends. The complete view of the operation is given in the scheme (Fig. 2 c).

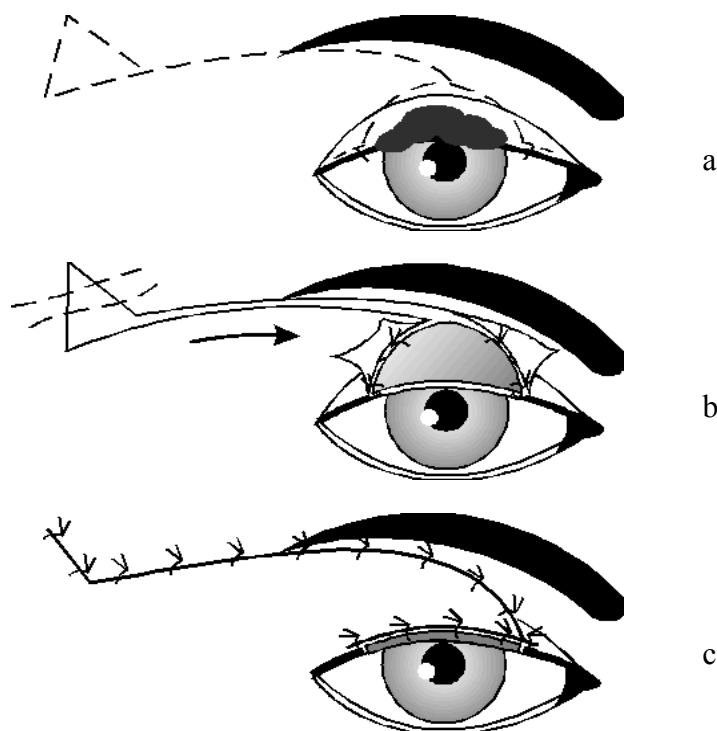


Fig. 2. The scheme of the operation in case of the penetrating resection of the medial third of the upper eyelid with one-stage alloautoplasty.

a) Dissection borders and lines of the skin incisions

b) Replacements of the eyelid tarsus defect with an allograft and direction of the separated skin displacement

c) The complete view of the operation

The operative technique of the partial penetrating resection of the internal third of the upper eyelid with one-stage alloautoplasty.

The tumour localization in the internal third of the upper eyelid purely occurred in 3 cases, but as for an internal angle with the upper eyelid there were 24 cases of affection. Partial penetrating resection of an eyelid was performed, the borderline of which depends on the morphological form of the tumour under the control of an operational microscope. Starting from the upper edge of the skin defect along the lower edge of the eyebrow an arched skin incision was carried out toward the temple, where the Burov's triangle was dissected (Fig. 3 a.). The skin separation was carried out bluntly. A careful hemostasis was performed.

If the tumoural process touched the lacrimal pathways they were sacrificed for the sake of ablastics. The formation of the lost eyelid skeleton was performed with an allograft, turned with

its smooth surface toward the eyeball, its size along the edge of the dissected eyelid was taken 2-3mm less than the dissected area; the allograft was carefully sutured to the eyelid stumps with the allotendinous sutures with the node dipped into the tissues (Fig. 3 b).

In cases of the skin affection of the internal angle and of internal commissure, when it had to be removed, the allograft fixation was carried out to the periosteum of the orbit internal wall, and when the periosteum was removed it was fixed to the opening in the bone made by the dental drill.

If there were any muscles remnants left they were sutured to the transplant. The skin plasty was carried out by the method of the lateral sliding. In the area of the eyelid edge the displaced skin flap was fixed to the transplant with the silk sutures.

A complete view of the operation is given in the scheme (Fig. 3 c). In the follow-up, the scars are, as a rule, slightly noticeable and the absence of the eyelashes in the internal part of the upper eyelid is the only sign of the performed operation .

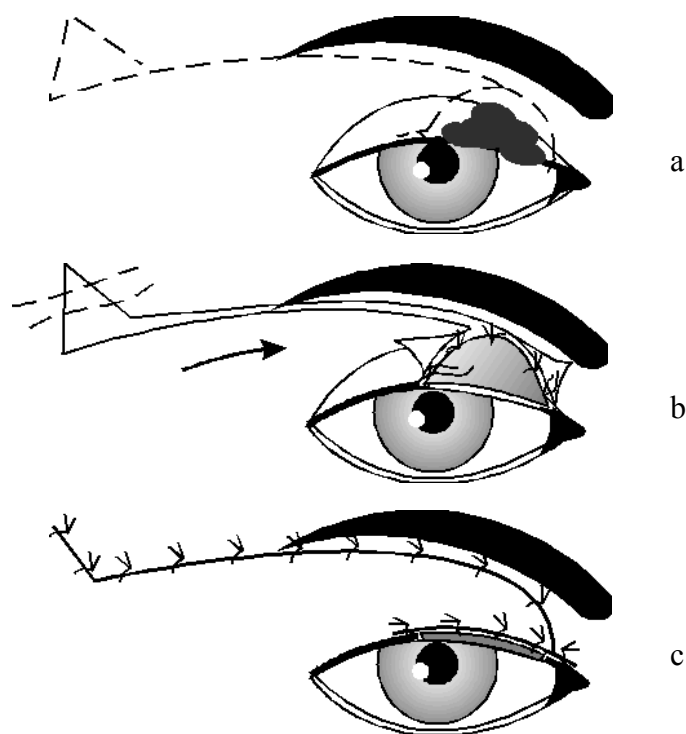


Fig 3. The operation scheme in case of the penetrating resection of the internal third of the upper eyelid with one-stage alloautoplasty.

a) Borderlines of the resection and skin incisions lines

b) Replacements of the eyelid tarsus defect by the allograft and direction of the separated skin displacement

c) Complete view of the operation

The operative technique of the partial penetrating resection of the internal third of the lower eyelid with one-stage alloautoplasty.

Our investigation showed that the tumour localization in the internal third of the lower eyelid occurred in 25 cases.

A penetrating resection of the eyelid was carried out taking the ablastics principles into account. The skin incision continued along the cheek toward the nasolabial fold, where the Burov's triangle was dissected (Fig. 4 a). The skin separation was wide with the following careful hemostasis. The eyelid skeleton defect was replaced by the allograft, cut out in the form of the defect, but its size was 2-3mm less along the edge of the eyelid, turned with its smooth surface toward the eyeball. The fixation to the stumps was performed with the allotendinous sutures with the knots dipped into the tissue.

There were complexities while fixing in case of the removal of the internal commissure and periosteum of the internal angle, then the internal part of the transplant was sutured straightly to the bone of the internal angle through the opening made with the dental drill. The plasty peculiarities of the penetrating resection of the lower eyelid consists of the tight suturing of the conjunctiva and the transplant, to avoid tears flowing under the buccal skin afterwards (Fig. 4 b). To restore the skin defect a lateral sliding method of the skin from the cheek was applied. The skin is, as a rule, freely displaced right onto the defect. The displaced flap was pulled up to the bed with the help of allotendinous sutures by the basal dermal layers in order to form a physiological recess. The surplus of the skin was dissected along the ciliary edge of the lower eyelid. In case the hemostasis was not certain to take place a drainage tube was left. The complete view of the operation is shown in the scheme (Fig. 4 c). In the follow-up the scars are, as a rule, slightly noticeable, as they go along a nasolabial fold.

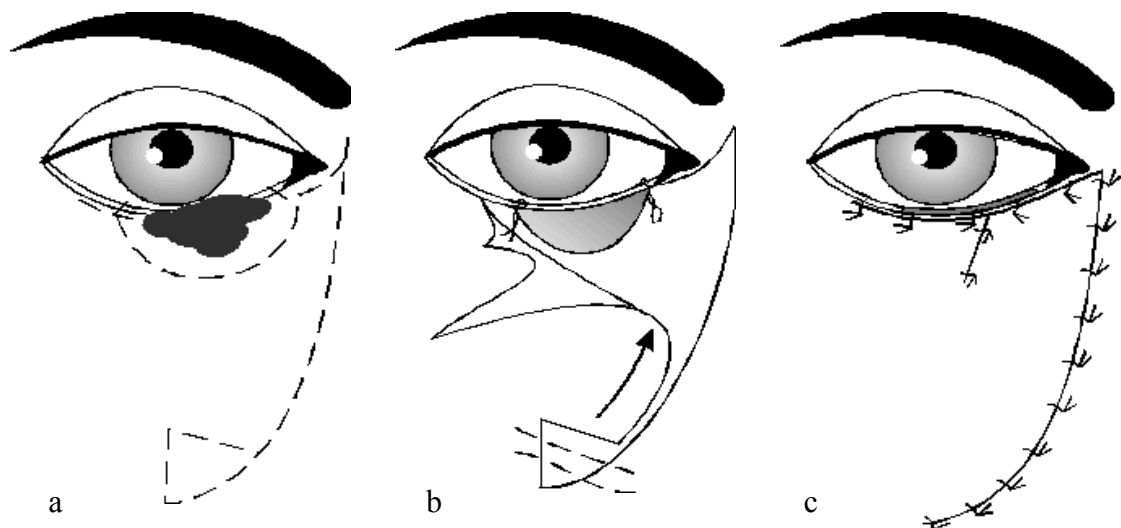


Fig. 4. The operation technique of the partial penetrating resection of the internal third of the lower eyelid with one-stage alloautoplasty.

- a) Borderline of through-resection and lines of dermal sections
- b) Replacements of tarsus defect by an allograft and direction of dermal displacement
- c) The complete sight of the operation

The operative technique of the partial penetrating resection of the medial third of the lower eyelid with one-stage alloautoplasty.

There were 33 cases of the tumoral localization in the medial third of the lower eyelid while a partial penetrating resection of the eyelid was performed in our investigation.

A penetrating resection of the eyelid was carried out. The incision was continued along the ciliary edge of the eyelid toward the temple, where the Burov' triangle was dissected (Fig. 5 a). The dermal separation was wide, with the following thorough hemostasis.

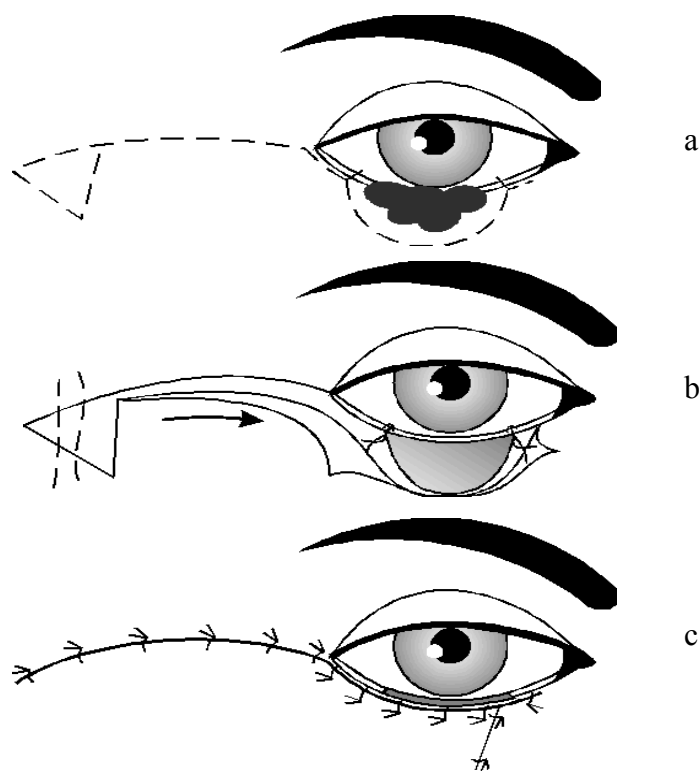


Fig .5 The operation scheme of the partial penetrating resection of the medial third of the lower eyelid with one-stage alloautoplasty.

- a) Borderlines of the penetrating resection of the medial third of the lower eyelid and of dermal incision lines
- b) Replacement of the tarsus defect by a allograft and direction of skin displacement
- c) The complete view of the operation

The eyelid skeleton defect was replaced by the allograft, cut out as per the form of the defect, but it was 2-3mm less along the eyelid edge, turned with its smooth surface toward the eyeball. The transplant was fixed to the eyelid stumps with allotendinous sutures carefully adapting the edges, in order to have the ciliary eyelid edge correctly formed. The tightness of the lower arch was provided thanks to the continuous allotendinous sutures right on the allograft and the remaining eyelid conjunctiva and that of the lower arch (Fig. 5 b). For the dermal plasty of the defect a method of the lateral skin sliding from the temporal area was applied. For the dermal relaxation and formation of the recess in the external angle of the palpebral fissure the exfoliated

skin was fixed to the periosteum with the allotendinous sutures by the basal layers. The dermal surplus was dissected along the eyelid edge and in the infraorbital area. In case for any reasons the dermal displacement from the temporal zone was impossible (scars), a method of the buccal dermal tissue removal was used just as in plasty of the internal angle of the palpebral fissure.

The complete view of the operation is shown in the scheme (Fig. 5 c). The follow-up indicates delicate and slightly distinguished cicatrices.

The operative technique of the partial penetrating resection of the external third of the lower eyelid with one-stage alloplasty.

There were 22 pure cases of the tumoral localization in the external third of the lower eyelid in our investigation, and 10 cases - of the affected external angle with the external third of both eyelids.

A penetrating eyelid resection was performed depending on the morphological kind of the tumour under the control of the operational microscope (Fig. 6 a). The dermal incision of the eyelid was continued onto the temporal area with the following skin separation. The hemostasis was carried out with an electroforceps.

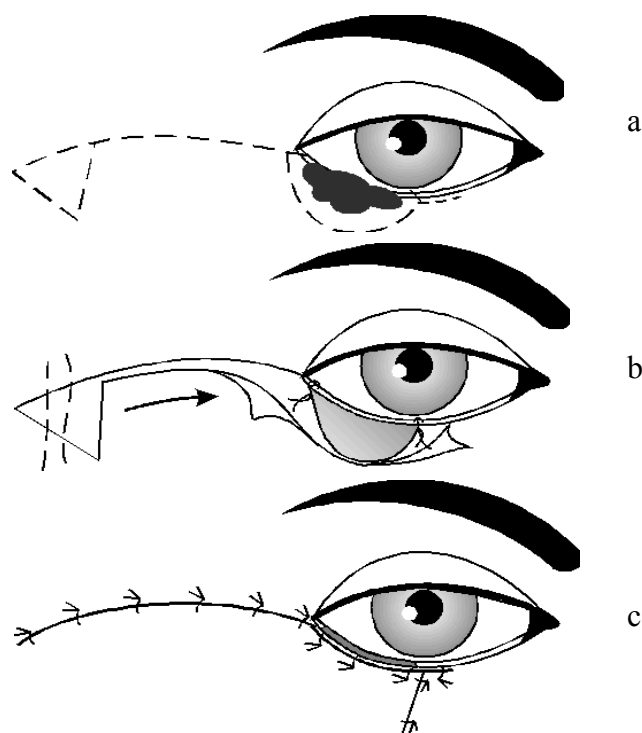


Fig 6. The operation scheme of the partial penetrating resection of the external third of the lower eyelid with one-stage alloautoplasty.

- a) Borderlines of the penetrating resection of the eyelid
- b) Replacement of the tarsus defect by the allotransplant and direction of the skin displacement
- c) Complete scheme of the operation

An eyelid cartilage was replaced by the allotransplant turned with its smooth surface toward the eyeball and very carefully sutured with allotendinous sutures to the stumps. The size

of the allograft along the edge of the dissected eyelid was taken 2-3mm less than the dissected zone for the eyelid to be tense after the plasty (Fig. 6 b).

If the external dermal angle is affected in case of the external commissure removal, the transplant is fixed to the periosteum of the external edge of the orbit, and if the periosteum and parts of the orbital wall are to be removed, in this case the transplant is fixed to the bone hole, performed by the dental drill. The hermetization was achieved by the continuous allotendinous sutures put on the remained eyelid conjunctiva and the allograft. The eyelid skin defect was restored by its own skin displaced from the temporal area.

If the use of the temple skin (cicatricial changes) was not possible, the displacement was performed with the help of buccal dermal tissue taken according to the method of the lateral sliding, then the incision was prolonged onto the ciliary edge of the eyelid and downwards along the nasolabial inlay.

The complete view of the operation is shown in the scheme (Fig. 6 c). The follow-up indicates slightly distinguished cicatrices and only the absence of the eyelashes in the external part of the lower eyelid tells about the performed operation.

Results of the investigation.

In the first years of the method development, dissections of the newly-formed eyelids with the “Alloplant” biomaterial, the average period of treatment and hospitalization made up $15,46 \pm 0,49$ days. Now this period of rehabilitation shortened up to $8,93 \pm 1,07$ days. Afterwards patients were observed in the out-patient conditions.

In the nearest post-operative terms the Alloplant engraftment in all cases was observed, the restored eyelids preserved the given form and size. During the 20 days' period the Alloplant keeping its white colour, gradually turned pink and by the 6 month after the operation it only slightly differed from the normal tissues. The results of biomicroscopy revealed the epithelization process of the biomaterial surface and the formation of the vascular channel in the subepithelial layer.

Postoperative complications (during a monthly post-operative term). Partial (marginal) necrosis of the dermal flap was observed in 3 patients (2 %). Complications in the form of keratitis occurred in 3 patients, keratitis got complicated by iridocyclitis in one of those patients. In all 3 cases patients underwent a partial resection of the medial third of the lower eyelid. Three cases of keratitis were caused by remaining or sliding off of the fixing suture on the internal surface of the intermarginal space. The average age of the patients with complications made up $66,78 \pm 3,1$ years.

Errors in the skin plasty at the initial stage of the method development, connected with an excessive tension of the flap and separation of too thin dermal layer, led to the marginal necrosis

of the dermal flap. All the postoperative complications were cut short by the conservative methods.

The nearest functional results were estimated as good in 134 operated on patients (88,7 %), as satisfactory – in 17 (11,3 %), unsatisfactory results were not observed. The nearest cosmetic results were estimated as good in all patients (100%).

The remote follow-up was estimated within more than a 12-month period of supervision. The remote functional results of the operations were estimated as good in 148 patients (98 %), as satisfactory - in 3 patients (2 %). The follow-up of the operation was estimated as good in all patients. There were no recurrences of the basal cell cancer during the period of observation.

Conclusion

Alloplant allografts can be successfully applied in order to create an eyelid skeleton and provide its strong fixing in plastic reconstruction after a partial eyelid penetrating resection. This excludes the necessity of using traumatic and multi-stage surgical manipulations of taking autogenic tissues. The opportunity to perform one-stage reconstruction of an eyelid allows to perform a surgical treatment of an eyelid cancer more radically.

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