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Czechoslovak Academy of Sciences, Prague (Czechoslovakia)
Laboratory of Plastic Surgery,
Head Prof. V. Karfík, M. D., DrSc.
Charles University,
Department of Anthropology,
Head Doc. RNDr. Ch. Troníček, CSc.

THE INTEROCULAR DISTANCE IN CHILDREN WITH CLEFT BEFORE THE OPERATION

† P. FIGALOVA, K. HAJNIŠ, Z. ŠMAHEL

Numerous congenital defects involving the cranium are at various degrees connected with lesser or larger deviations in the interocular distance. In patients with clefts of the lip and palate, we also meet frequently with increased intercanthal width. This is already visually detectable, because the symmetrical arrangement of the pair organs along the central facial axis affords clear prominence to such abnormities. We are not refering of course to cases, where the widening of the interocular space is caused by associated anomalies.

Increased interocular distance in patients with cleft, has been already reported for ex. by Psaume (1957) and Graber (1964). Only the reports by Havlová (1969), Adusse et al (1971) and Müllerová-Havlová, Brejcha (in print) based on cranioskiagraphic measurements and by Moss (1965) and Farkas, Lindsay (1972) based on direct cephalometric investigations, drew greater attention and afforded statistical analysis of the measured values. None of these studies referred, however, only to children at the age prior to primary operations of the lip or palate. It is in infants, however, where the widening of the interocular space is most striking. This is chiefly due to small modelling or to considerable flatness of the child face, which makes the anomaly seemingly more prominent. Further growth, predominantly growth into depth, makes the defect less striking though in reality it may be also partly corrected. This could be documentated by the actual proportional growth as well as by renewed nasal breezing after suture. Preliminary conclusions may be drawn from the comparison of results from studies of the pre-operative condition and those from studies of the condition in adult operated-on patients. A full reply can, however, be only afforded by longitudinal studies of these same individuals.

We are reporting in our study the statistical evaluation of the interocular and biocular width as well as the intercanthal index in children afflicted by the individual types of cleft prior to operations, in comparison with the controls. The report should contribute to better recognition of facial morphology in cleft deformities and should serve as basis for further studies.

MATERIAL AND METHODS

Anthropological examinations were carried out in 147 children (91 boys and 56 girls) with clefts of the lip and/or palate, in the years 1966—1973 from material of the Department of Plastic Surgery at Charles University in Prague. The examination was carried out when the patient was admitted for primary operation of the lip (in total clefts and clefts of the lip i.e. in the 6—12 months of life) or palate (in isolated clefts of the palate i.e. at the age of 3½—4½ years) according to the anthropologic record sheet for congenital facial defects (Hajniš, Farkaš, 1969). We selected from the data two cases for our studies — the distance of the internal canthus, i.e. the interocular width (en-en) and the distance of the external canthus, i.e. the biocular width (ex-ex). Furthermore, we calculated from the data the intercanthal index, which expresses the distance of the internal canthuses in percentage of the distance of the external canthuses [100 x(en-en): ex-ex].

A statistical analysis of the ascertained data is demonstrated on tables 1—3. They show the distribution of the group into sub-groups according to the individual types of cleft and their numbers (n). Each time there is also a control group attached (aged 6—12 months for total clefts and clefts of the lip, 3½—4½ years old children for isolated clefts of the palate) obtained from extensive anthropometric research carried out in Prague and Central Bohemia in children aged 3 months to 6 years (Figalová, Šmahel, 1972). The tables contain the mean (X), the standard deviation (s), the mean average error (s-x), the coefficient of variation (v) and the span of the ascertained minimal and maximal value. The last column demonstrates the results of the t-test for the respective control group. Total unilateral and bilateral clefts are also surveyed in a common class.

Table 4 demonstrates the representation of increased interocular distance of lesser (euryopia) and higher (hypertelorism) degree according to the intercanthal index in the individual forms of clefts and in the controls. This index is a good indicator of changed interocular width and is being used as such (Gorlin, Pindborg, 1964). A classification of the individual types of shape according to this index has already been carried out by Günther (1933), who laid down the limits of euryopia of 38—42 index units (i) and the region of hypertelorism above 42 units (stenopia below 28,4 i). We controlled this classification in 1471 healthy children in Prague of our research group (Figalová, Šmahel, 1972) and in another 1812 children of the research group of Hajnišová (1968), which jointly cover the age period from 0—18 years. We ascertained that the mean index value does not change too much in the course of age and that it is the same with both sexes; the level of 38 index units

Tab. 1. Interocular distance en - en (in mm)

		n	$\bar{x}$	s	$s_{\bar{x}}$	v	min-max	t-test
Control (6—12 months)	boys	57	25,10	1,35	0,19	5,38	21—33	—
	girls	62	25,16	2,23	0,28	8,86	20—31	—
Total clefts	boys	66	27,82	2,62	0,32	9,42	22—36	$7,35 > P_{0,001}$
Bilateral + unilateral	girls	26	26,88	2,49	0,49	9,26	21—31	$3,02 > P_{0,001}$
Total bilateral clefts	boys	23	27,83	2,86	0,60	10,28	22—34	$4,33 > P_{0,001}$
	girls	10	26,90	3,04	0,96	11,30	21—31	1,74*
Total unilateral clefts	boys	43	27,81	2,52	0,38	9,06	24—36	$6,45 > P_{0,001}$
	girls	16	26,88	2,19	0,55	8,15	23—31	$2,77 > P_{0,01}$
Clefts of lip	boys	14	26,57	1,62	0,43	6,10	24—30	$3,13 > P_{0,001}$
	girls	16	24,13	1,97	0,49	8,16	21—28	1,81 insignificant
Control	boys	92	27,66	2,05	0,21	7,41	24—35	—
($3^1/_2$—$4^1/_2$ years)	girls	87	26,82	1,85	0,19	6,89	23—31	—
Clefts of palate	boys	11	27,18	2,53	0,76	9,31	22—32	0,61 insignificant
	girls	14	26,29	1,84	0,49	7,00	22—29	1,00 insignificant

* insignificant due to the small number of cases.

$P_{0,01}$—$P_{0,001}$ = significantly larger at 1% to 0,1% level.

equals approximately the average increased by +1,5s and the level of 42 units equals the average increased by +3s, again with both sexes. The bottom limit of euryopia amounting to 38 units i.e. $\bar{x}$ +1,5s, corresponds thus to the classic classification of anthropologic indexes and counts for the population of Central Europe (Günther, however, applied the limit of $\bar{x}$ +2s). The limit of hypertelorism of 42 units i.e. $\bar{x}$ +3s is then the hypothetic border of the pathologic condition. The maximum ascertained in both researches, falls each time into the sphere of euryopia, only with 4 boys and 3 girls it falls into the sphere of hypertelorism (i.e. of 3283 children 0,21%), thus confirming the rare incidence in the healthy population. This conception of hypertelorism must not be mistaken, however, for Greig's hypertelorism, which concerns a very rare type of syndrome.

It is obvious from the above that we may use the original determination of the limits of euryopia and hypertelorism by Günther according to the intercanthal index, also for our present population (but we do not agree in the determination of the limit of stenopia, which we are studying in a prepared report — Šmahel, Figalová). The advantage of the classification is its simplicity and uniformity. Because, however, the index reflects the changes in the interocular distance well, the direct dimensions must be also born in mind, because the biocular width may be rather changed and this shows up in the

index in the same way. But we always record with it the proportional deviations.

Diagrams 1—3 express for comparison by the method of histograms, the distribution of three evaluated indexes in the control group (n = 57 boys and 62 girls) and in the group of total clefts (n = 66 boys and 26 girls). The distribution of these signs is demonstrated according to size in the normal child population and in patients.

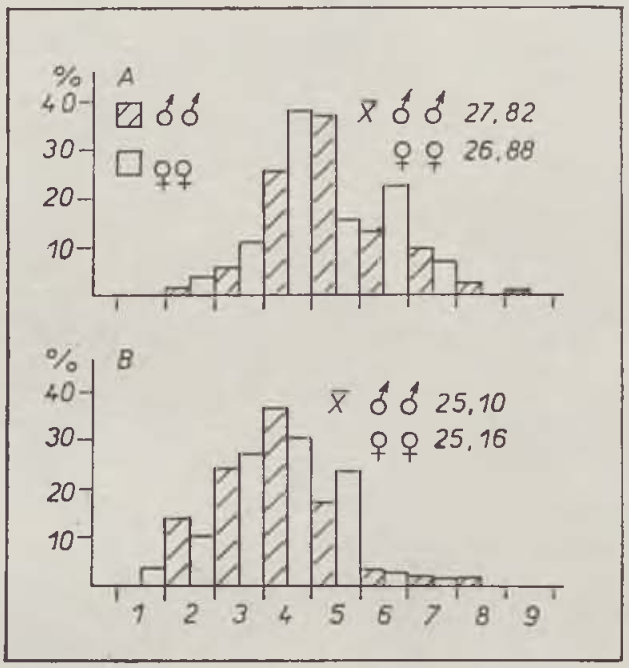

Diagram 1. Distribution of the interocular distance (en-en) according to dimension in the controls (B) and in patients with total bilateral + unilateral clefts (A). The individual columns comprise dimension of 2 mm within a span of 19 to 36 mm (i.e. the first 19—20 mm, the second 21×22 mm etc.)

RESULTS

Interocular distance (Tab. 1, Diagram 1). We ascertained in the group of clefts lip and palate divided according to type, in all cases, a significantly widened interocular width already at 1—0,1% level. Only with girls with total bilateral cleft are the results of the t-test not significant even at 5% level, just as with girls with only cleft of the lip. The former case is, however, caused by the small number of persons in the class (compare with the mean in total bilateral and unilateral clefts, where the difference is significant). In patients with isolated clefts of the palate on the other hand, the differences in the interocular width are, in comparison with the controls, only insignificant.

The coefficients of variation are not, in spite of the small number of persons in some groups, much higher than in the well frequented control class and they confirm thus that the group can be statistically evaluated. Diagram 1 demonstrates the distribution of the index according to size with

Tab. 2. Biocular distance ex - ex (in mm)

		n	$\bar{x}$	s	$s_{\bar{x}}$	v	min-max	t-test
Control (6—12 months)	boys	57	75,39	4,59	0,64	6,09	67—87	—
	girls	62	73,66	3,96	0,51	5,38	65—81	—
Total clefts (unilateral + bilateral)	boys	66	76,59	5,66	0,70	7,39	67—98	1,26 insignificant
	girls	26	72,31	6,60	1,29	9,13	60—87	0,97 insignificant
Total bilateral clefts	boys	23	76,39	7,42	1,55	9,71	67—98	0,60 insignificant
	girls	10	72,00	6,11	1,93	8,49	60—82	0,83 insignificant
Total unilateral clefts	boys	43	76,70	4,50	0,69	5,87	67—88	1,39 insignificant
	girls	16	72,50	7,09	1,77	9,78	63—87	0,63 insignificant
Clefts of lip	boys	14	75,64	5,81	1,55	7,68	68—84	0,75 insignificant
	girls	16	73,06	6,20	1,55	8,49	60—82	0,37 insignificant
Control ($3^1/_2$—$4^1/_2$ years)	boys	92	78,10	4,33	0,45	5,54	68—90	—
	girls	87	76,50	4,24	0,45	5,54	68—92	—
Clefts of palate	boys	11	73,36	6,16	1,86	8,40	66—84	$2{,}48 > P_{0{,}02}$
	girls	14	74,79	5,62	1,50	7,51	66—84	1,09 insignificant (but smaller)

$P_{0,02}$ = significantly smaller at 2% level.

the controls and with the patients with bilateral and unilateral clefts. There is an evident shift in the representation of the individual types towards higher values in boys and girls with cleft.

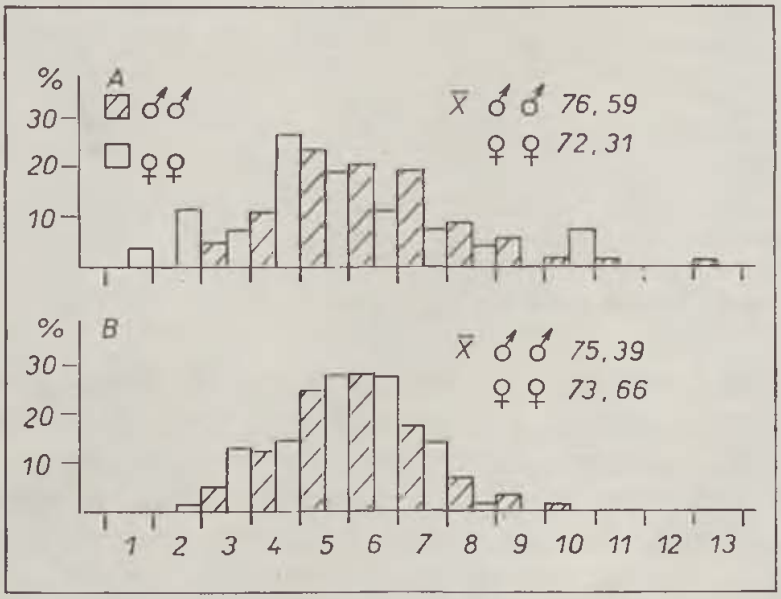

Diagram 2. Distribution of the biocular distance (ex-ex) according to dimension in the controls (B) and in patients with total bilateral + unilateral clefts (A). The individual columns comprise dimension of 3 mm in a span from 60 to 98 mm (i.e. the first 60—62 mm, the second 63—65 mm, etc)

The biocular distance (Tab. 2, Diag. 2). We did not record in a single group of children with clefts of the lip and palate, any significant differences in comparison with the controls. We rather ascertained in patients with isolated clefts of the palate, a decrease of the biocular width, which is with boys at a 2% level of significance. The coefficients of variation are of medium height and confirm again that the group can be well statistically evaluated. Diagram 2 demonstrates in both sexes the wider dispersion in the representation of the individual dimensional types of the biocular distance in the group of total clefts if compared with the control class.

Tab. 3. Index intercanthalis $\frac{en - en \cdot 100}{ex - ex}$

		n	$\bar{x}$	s	$s_{\bar{x}}$	v	min - max	t-test
Control (3—6 months)	boys	57	33,30	2,54	0,36	7,63	28,95—39,76	—
	girls	62	34,19	2,78	0,36	8,13	29,85—40,26	—
Total clefts (bilateral+unilateral)	boys	66	36,48	3,61	0,44	9,90	27,56*-45,14	$5,58 > P_{0,001}$
	girls	26	37,38	3,61	0,71	9,66	29,17—44,29	$4,04 > P_{0,001}$
Total bilateral clefts	boys	23	36,57	4,36	0,91	11,92	27,56*-45,14	$3,34 > P_{0,001}$
	girls	10	37,50	3,46	1,09	9,23	29,17—41,10	$2,88 > P_{0,01}$
Total unilateral clefts	boys	43	36,44	3,25	0,50	8,92	31,58—42,47	$5,06 > P_{0,001}$
	girls	16	37,31	3,77	0,94	10,10	31,03—44,29	$3,12 > P_{0,001}$
Clefts of lip	boys	14	35,29	3,32	0,89	9,41	30,13—39,71	$2,07 > P_{0,05}$
	girls	16	33,19	3,07	0,77	9,25	28,95—38,71	1.18 insignificant
Control ($3^1/_2$—$4^1/_2$ years)	boys	92	35,43	1,86	0,19	5,25	30,00—40,00	—
	girls	87	35,11	2,31	0,25	6,58	28,66—40,54	—
Clefts of palate	boys	11	37,18	2,79	0,84	7,50	32,12—41,18	$2,03\ P_{0,05}$
	girls	14	35,07	1,82	0,49	5,19	32,89—38,06	0,07 insignificant

*) Stenopia according to classification by Günther (below 28,4 index units) — one case (none amongst the control).

$P_{0,05}$—$P_{0,001}$ significantly higher at 5% to 0,1% level.

Index intercanthalis (Tab. 3, 4, Diag. 3). The greater interocular width in the individual groups of patients with cleft of the lip and palate, reflects clearly in the averages of the intercanthal index, because the differences in the biocular width are, in comparison with the controls, small. With the exception of mere cleft of the lip in girls where the difference is not significant, we ascertained in the rest of the cases always a significant increase of the index values, mostly already at 1—0,1% level (only with cheiloschisis in boys it was at 5% level of significance). In children with isolated cleft of the palate, there is no difference in girls if compared with the controls, whereas we found in boys also an increase of the index values, at 5% level

of significance. It is due to the decreased biocular width. To the coefficients of variation applies the same as to the previous signs.

Diagram 3 demonstrates a very clear shift to higher values in the representation of the dimensional types of the intercanthal index in patients compared with the controls. The distribution of this index in the control class, demonstrates also the assymmetrical distribution of the sign, with a rapid decrease of cases with very small interocular distance.

Table 4 demonstrates in absolute and in percentual data, the representation of increased interocular width of lesser (i.e. euryopia) and greater (i.e.

Tab. 4. Representation of euryopia and hypertelorism according to index intereanthalis

		n euryopia (38—42 i)			hypertelorism (42 i-x)	
		abs		%	abs	%
Control (3—6 months)	boys	57	4	7,02	0	—
	girls	62	6	9,68	0	—
Total clefts (unilat. + bilat.)	boys	66	16	24,24	5	7,58
	girls	26	7	26,92	2	7,69
Total bilateral clefts	boys	23	6	26,09	2	8,70
	girls	10	4	40,00	0*	—
Total unilateral clefts	boys	43	10	23,26	3	6,98
	girls	16	3	18,75	2	12,50
Clefts of the lip	boys	14	3	21,43	0	—
	girls	16	1	6,25	0	—
Control ($3^1/_2$—$4^1/_2$ years)	boys	92	9	9,78	0	—
	girls	87	7	8,05	0	—
Clefts of palate	boys	11	5	45,45	0	—
	girls	14	1	7,14	0	—

*) Balanced by increased frequency of euryopia.

hypertelorism) degree, according to the intercanthal index in the corresponding types of cleft and in both control classes (Günther's classification, see methods). We ascertained hypertelorism only in individuals with total clefts at relatively regular representation (in average about 7,5% in both sexes). We did not record it only amongst girls with total bilateral cleft, but in one case the value of the index approaches the limit of 42 index units. These belong, however, still under euryopia, the frequency of which is thus increased in this group.

We may ascertain a slight increase in the interocular distance corresponding to euryopia, even in the healthy population. Pauli (1955) ascertained it in children of the Ruhrgebiet in 15,25% whereas according to data by Günther (l.c.) it may be expected in 2—3%. In our case we may expect it theoreti-

cally, at symmetrical distribution of the sign, in 6,5% (because euryopia = $\bar{x}$ +1,5 to +3s). The somewhat higher representation in the control classes (7—10%) is caused by the assymmetrical distribution of the sign (Diag. 3), where the decreased interocular width is less frequent. The individual groups of patients with clefts of lip and palate, disclose a significant increase of the frequency of euryopia, which mostly amounts to 1/5—1/4 of all cases. Only in girls with cheiloschisis it was ascertained in 6,25%, but the number of persons in this class was low. A low number of persons in the class, causes also irregularities in the representation of euryopia in individuals with palatoschisis. We ascertained, however, one case of stenopia in the cleft group (none in the control).

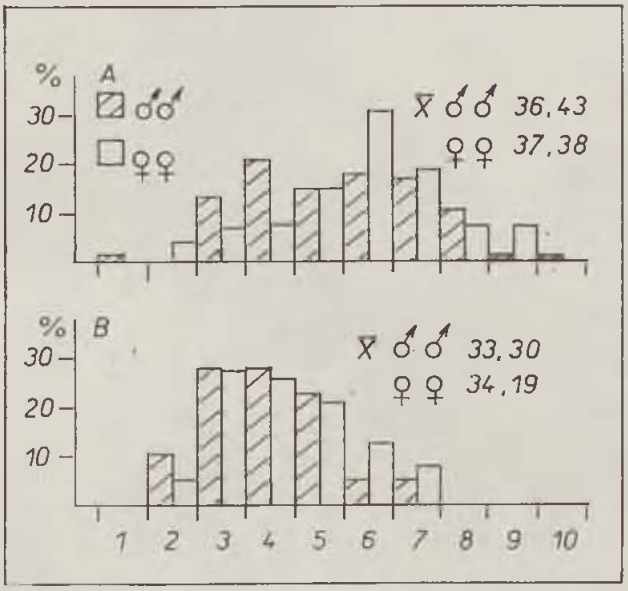

Diagram 3. Distribution of the intercanthal index according to dimension in controls (B) and in patients with total bilateral + unilateral clefts (A). The individual columns comprise the value of 2 index units in a span from 27 to 46 units (i.e. the first 27—28 i, the second 29—30 i, etc.)

DISCUSSION

The statistical evaluation of the metrical data of the basic dimensions of the orbital regions in children with clefts has been reported only rarely. Aduss et al. (1971) measured the interorbital width from the skiagrams of 285 patients studied longitudinally. The data were processed on transversal basis and comprise the period from 6 months to 17 years. He ascertained in total unilateral and bilateral clefts and in clefts of the lip an increase in the interorbital width which usually reaches even the standard deviations of the compared control group. In the group with isolated clefts of the palate, the differences are, in comparison with the controls, however, only small. This corresponds in principle even with our findings from direct cephalometric investigation and also with the results of Farkas and Lindsay (1972). These authors examined 145 adult patients with cleft, operated-on in childhood. On basis of measurements of the distance of the internal corners of the eye

lids, they ascertained that this dimension was larger in the groups of total unilateral and also bilateral clefts at a level of significance of 2% and 5% in men (in women it was insignificant). They ascertained no differences in the group with isolated clefts of the palate in men in comparison with the controls, but in women they recorded a decrease in the interocular distance (but it was not significant). In our group too, the averages of this sign in patients with palatoschisis are only a little lower than in the control class. This is probably caused by slighter, gracile construction of the face of the child with such type of cleft, this being possibly connected with their generally smaller physical dimensions, as mentioned by Aduss et al., 1971 (according to him, Meskin and Pruzansky ascertained a lower weight in infants with this type of cleft and derive that the children might be smaller). This is also confirmed by the smaller dimensions of the biocular width (see further).

Müllerová-Havlová and Brejcha (in print) are further authors who proved an increased interorbital distance. They carried out skiagraphic examination in 91 children with total unilateral cleft, aged 4—7 years and they claimed in both sexes highly significant differences if compared with the control group (at 0,1% level of significance). The same authors proved even a statistically significant increase of the biorbital width at a 5% level of significance in boys and already at 0,1% in girls. Farkaš and Lindsay (1972) also calculated in operated-on adults with total clefts, a significant increase of the mean values of the biocular width (with unilateral cleft at 0,1% level of significance in men and 2% in women, with bilateral clefts at 0,1% level of significance in men and insignificantly in women). Our findings do not agree here, we did not prove significant differences in any of the groups of the type of cleft lip and palate. This is of course a comparison of a pre-operative group with a group of adults of Farkas and Lindsay (1972) against the skiagraphic investigations of Müllerová-Havlová and Brejcha (in print). It may have caused the mentioned differences and requires further investigation.

We recorded in patients with isolated cleft of the palate, a decrease of the biocular distance with a 2% level of significance in boys. Farkas and Lindsay (1972) also ascertained a similar decrease in adults of both sexes, with a rather significant level (1%) in women. This is probably connected with the above mentioned more gracile construction of the face of individuals with palatoschisis, also mentioned by surgeons at aspective observations.

Although the intercanthal index is most useful in the assessment of changes in the interocular distance, we found only one report in which it was calculated. Moss (1965) reports its values for adolescent cleft individuals at 36,1 index units (i) from direct measurements and 37,1 even at determination from photographs, this differing significantly (at 1% level) from the controls without clefts (32,6 even in the former case and 32,7 even in the latter). Thus the good agreement with our results is evident.

It is not very well possible, to compare the incidence of hypertelorism in our group with other authors, because of the different classification. Usually it is evaluated on basis of direct interocular distance, for ex. already as a

value exceeding the mean of the control by 2 s (Farkas, Lindsay, 1972; 6,9% of cases), or even by less (Aduss et al. 1971; 2,4% of the cases). Thus, however, even a certain and stabile part of the healthy population is hypertelorie at normal distribution of the sign. We consider $\bar{x}$ +3s to be a more suitable limit for hypertelorism as a pathologic condition and a slighter degree of increased interocular distance ($\bar{x}$ +1,5s to +3s) should be only evaluated as euryopia (see methods). Under these conditions, which correspond to the classification of the intercanthal index by Günther used also by us in this report, hypertelorism was only ascertained in individuals with general clefts (approx. in 7,5% of cases). We ascertained usually an increased frequency of euryopia in all types of clefts (the small number of cases causes some irregularities).

The increased interocular width occurs more frequently also in the parents of cleft children (Fraser, Pashayan, 1970), although in the averages the difference was not stated as significant. In our study too, we did not ascertain a tendency to hypertelorism in the nearest relatives of the patients (Figalová, Šmahel, 1971 and a report under preparation).

H. S.

SUMMARY

On basis of an anthropometric pre-operative examination of 147 children with cleft of the lip and/or palate we are in a position to report about changes in the basic dimensions of the orbital regions, as follows:

1. In clefts of the lip and palate classified according to type, an increased interocular width has been ascertained, which in the majority of cases is significant already at a level of 1—0,1%. In patients with isolated clefts of the palate, however, the differences compared with the controls are negligible.

2. We ascertained no greater differences in the biocular width in children with clefts of the lip and palate if compared with the controls, but in patients with isolated clefts of the palate the averages are smaller and in boys at a significance level of 2%.

3. When comparing both measured dimensions in patients with isolated clefts of the palate and in patients with the other types of clefts, their smaller dimension in the first group is evident. This agrees with the mentioned, rather gracile, construction of the face of children with palatoschisis (the somewhat differing morphology of the face of children with isolated cleft of palate can be observed already on sight).

4. The increased interocular width in children with clefts of the lip and palate and the decreased biocular width in children with isolated clefts of the palate appears in the means of the intercanthal index. Usually we recorded in the evaluated groups a significant increase of the index (up to 0,1% level of significance). The proportionality is thus disturbed.

5. The incidence of hypertelorism, determined according to the verified classification of the intercanthal index by Günther (1933), we ascertained only in total clefts (in 7,5%). Usually we determined, however, in all types of clefts an increased frequency of euryopia.

RÉSUMÉ

Distance interoculaire chez les enfants avec les fissures avant l'opération

Figalová P., Hajniš K., Šmahel Z.

Sur la base des examens anthropométriques préopératoires de 147 enfants avec les fissures de la lèvre ou du palais, on peut introduir les faits suivants concernant les modifications des dimensions fondamentales de la région orbitale:

1. Sur les fissures de la lèvre et du palais réparties selon le type, on a constaté la largeur interoculaire augmentée dans la plupart des cas et celle-ci significative déjà au niveau de 1—0,1%. Au contraire, chez les malades avec les fissures du palais isolées, les différences contre le contrôle sont peu importantes.

2. On n'a pas constaté de différences importantes dans la largeur bioculaire chez les enfants avec les fissures de la lèvre et du palais en comparaison avec le contrôle tandis que les diamètres chez les malades avec les fissures du palais isolées sont moindres, chez les garçons significativement au niveau de 2%.

3. En comparent les deux dimensions mesurées chez les malades avec les fissures du palais isolées et chez les malades avec d'autres types des fissures, la dimension plus basse du premier groupe est évidente. Cela est en accord avec la structure plus gracile de la face des enfants avec une uranoschise (la morphologie un peu différente de la face chez l'enfant avec la fissure du palais isolée est remarquable déjà à la vue).

4. La largeur interoculaire augmentée chez les enfants avec les fissure de la lèvre et du palais et la largeur bioculaire réduite chez les enfants avec les fissures du palais isolées se traduit dans les diamètres de l'index intercanthal. Dans les groupes évalués on a constaté, généralement, une augmentation significative de l'index (jusqu' au niveau de 0,1%). Ainsi, la proportionalité est altérée.

5. On n'a constaté l'apparition de l'hypertélorisme — déterminé selon la division attestée de Günther (1933) de l'index intercanthal — que chez les fissures totales (en 7,5%). Mais, d'habitude, on a trouvé une fréquence élevée de l'euryopie chez tous les types des fissures.

ZUSAMMENFASSUNG

Die Zwischenaugenentfernung bei Kindern mit Spalten vor der Operation

Figalová P., Hajniš K., Šmahel Z.

Auf Grund der anthropometrischen Voroperationsuntersuchung von 147 Kindern mit Lippen- und/oder Gaumenspalten kann bezüglich der Veränderungen in den Grunddimensionen der Orbitalgegend folgendes angeführt werden:

1. Bei den je nach Typ eingeteilten Lippen- und Gaumenspalten wurde erweiterte interokuläre Breite festgestellt, und zwar in der Mehrzahl der Fälle signifikant bereits auf 1—0,1 % Ebene. Demgegenüber sind die Unterschiede bei Kranken mit isolierten Gaumenspalten im Vergleich zu den Kontrollen geringfügig.

2. Bezüglich der biokulären Breite bei Kindern mit Lippen- und Gaumenspalten fanden wir keine grösseren Unterschiede im Vergleich zu den Kontrollen; bei Kranken mit isolierten Gaumenspalten sind die Mittelwerte dagegen geringer, bei Jungen signifikant auf 2 % Ebene.

3. Beim Vergleich zwischen den zwei gemessenen Dimensionen bei Kranken mit isolierten Gaumenspalten und bei Kranken mit den übrigen Spaltentypen ist ihre geringere Grösse bei der ersten Gruppe offenbar. Dies steht mit dem angeführten grazileren Gesichtsbau bei Kindern mit Palatoschisis in Übereinstimmung (gewissermassen

unterschiedliche Gesichtsmorphologie des Kindes mit isolierter Gaumenspalte ist bereits aspektiv bemerkbar).

4. Die erweiterte interokuläre Breite bei Kindern mit Lippen- und Gaumenspalten und die verminderte biokuläre Breite bei Kindern mit isolierten Gaumenspalten machten sich erkennbar in den Mittelwerten des Intercanthalindexes. In den beurteilten Gruppen verzeichneten wir in der Regel einen signifikanten Anstieg des Indexes (bis auf 0,1 % Ebene). Die Proportionalität ist hiermit gestört.

5. Das Vorkommen von Hypertelorismus, bestimmt nach der überprüften Klassifikation des Intercanthalindexes nach Günther (1933), fanden wir lediglich bei Allgemeinspalten (7,5 % der Fälle). Bei sämtlichen Spaltentypen fanden wir jedoch in der Regel erhöhte Frequenz der Euryopie.

RESUMEN

Distancia interocular en los niños con fisuras ante la operación

Figalová P., Hajniš K., Šmahel Z.

En la base de una examinación antropométrica preoperativa de 147 niños con fisuras del labio y/o del paladar podemos constatar sobre las modificaciones en las dimensiones básicas de la región orbital lo siguiente:

1. En las fisuras del labio y del paladar divididas según su tipo fue constatada la distancia interocular aumentada en la mayoría de los casos como significante ya en el nivel de 1—0.1%. En contrario en los pacientes con fisuras del paladar aisladas las diferencias en contra el control son muy poco significantes.

2. No observamos diferencias mayores en la distancia biocular en los niños con fisuras del labio y del paladar en comparación con el control, mientras en los pacientes con fisuras del paladar aisladas los promedios son menores, en los varones significamente en el nivel de 2%.

3. Al comparar las dos dimensiones medidas en los pacientes con fisuras del paladar aisladas y en pacientes con los demás tipos de fisuras es evidente el tamaño menor que en el primer grupo. Esto está de acuerdo con la estructura más grácil de la cara de los niños con palatosquisis (la morfología algo diferente en el niño con una fisura del paladar aislada es perceptible ya por vista).

4. La distancia interocular aumentada en los niños con fisuras del labio y del paladar y la distancia biocular abreviada en los niños con fisuras del paladar aisladas se manifiesta en los promedios del índice intercanthal. Generalmente observamos un aumento significante del índice (hasta el nivel de 0.1%) en los grupos evaluados. Así la proporcionalidad está alterada.

5. La presencia del hipertelorismo, determinada según la probada división del indice intercanthal de Günther (1933) fue constatada solamente en fisuras totales (en 7.5%). En todas las fisuras, sin embargo, generalmente constatamos la frecuencia de la euriopia aumentada.

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Dr. Z. Šmahel, Šrobárova 50, 100 00 Praha 10, Czechoslovakia

Research Institute for Mother and Child, Warszawa (Poland)
Director Prof. K. Bożkowa, M.D.
Department of Pediatric Surgery
Chief Prof. W. Poradowska, M.D.

GOLDENHAR'S SYNDROME, TYPICAL AND ATYPICAL FORMS
Report of Two Cases

M. JAWORSKA, Z. DUDKIEWICZ

In 1952, Goldenhar (4) reported 3 cases of oculo-auricular dysplasia with two characteristic anomalies: 1. Epibulbar dermoid — whitish benign congenital tumor located in the lower temporal quadrant of one or both eyes. It tends to grow after birth and consists of cutaneous and fatty elements; 2. Preauricular appendages — fleshy or chondromatous tags on the line between the *tragus* and the oral angle. These anomalies are frequently accompanied by coloboma of the median part of the eyelid, microphthalmia, aplasia or hypoplasia of external surditory meatus, preauricular fistula and macrostomia.

Similar cases were soon described by Hoffman and Velissaropoulos (7). Their first two patients were affected only with "dermoid-appendices" anomaly but in three next cases it was associated with progressive degree of facial dysplasia which bore some resemblance to mandibulo-facial dysostosis. Gorlin et al. (5) reported their cases under the term of oculo-auriculovertebral dysplasia as they found a wide variety of vertebral abnormalities — *hemivertebrae, occipitalization of atlas, spina bifida occulta* and others. Since then, *Goldenhar's* syndrome has been additionally defined as "oculo-auriculo-vertebral dysplasia", for instance in the clinical atlas of congenital facial anomalies (1) or on the list of ocular syndromes (3).

Though sufficiently identified to be regarded as a well defined clinical entity, the syndrome represents a link in the long chain of facial dysplasia and its diagnosis may be complicated by the occurrence of transitory or atypical forms (2, 6).

REPORT OF CASES

Case 1. K. M., born at term with birth weight 3500, was admitted as 4-year old boy for operation of preauricular appendages. He was well developed physically and mentally on the lower border of normal (*IQ* 83). No evidence of a hereditary pattern.

He was affected only with facial anomalies (Fig. 1 a, b, c): milky white tumor in the lower temporal quadrant of the left eye, partially covering the

Fig. 1a

Fig. 1b

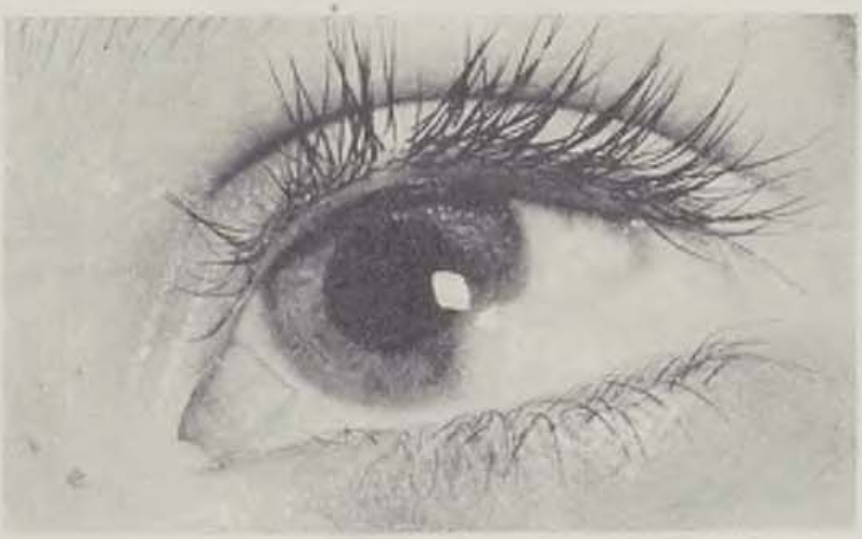

Fig. 1c

Fig. 1a, b, c. — Case 1

Fig. 2c

Fig. 2b

Fig. 2c

iris. Slight facial asymmetry was due to macrostomia and hypoplasia of the mandibular arch on the left side. There was also a difference between the size and course of external auditory passages — the right meatus was normal, the left one narrow and slightly distorted.

Preauricular tags were excised. They were found to be composed of soft tissues with cartillage situated in the middle of each lesion. Surgical correction of macrostomia was performed.

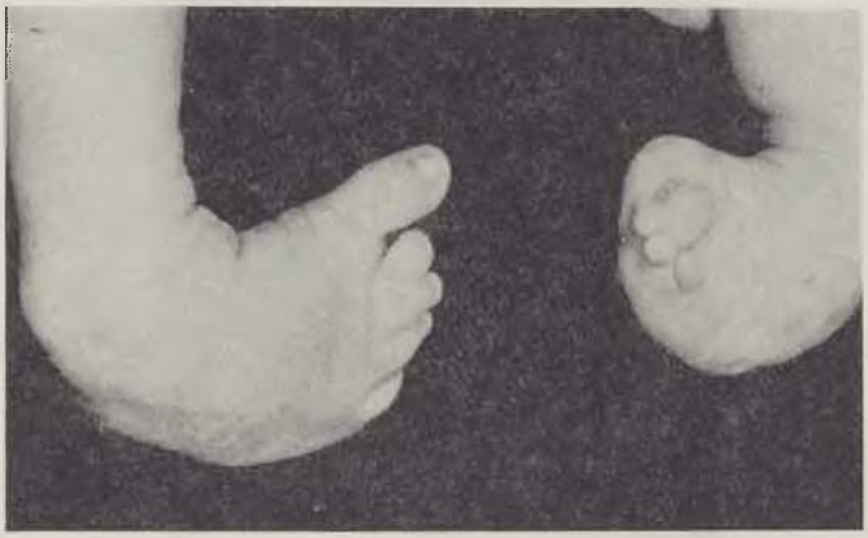

Fig. 2d

Fig. 2a, b, c, d. — Case 2, age of 3 months

This case is an example of typical G o l d e n h a r ' s syndrome. It can be also called oculo-auricular dysplasia or the 1st and 2nd arch syndrome with epibulbar lipo-dermoid.

Case 2. A. K., 3-month old male infant was referred for diagnosis and treatment of multiple congenital anomalies (Fig. 2 a, b, c). He was born prematurely with birth weight 2150. No family history of congenital malformations.

Face: bilateral microphthalmia, left eye — dermoid growing in size since birth and extensively occluding the cornea; right eye — *coloboma* of the lower eyelid close to the underdeveloped lacrimal duct. Corneo-coniunctival adhaesion causing downward displacement of the iris.

Nose: the apex deviated to the left side, hypoplastic cartillage of the right nostril.

Mouth: cleft of primary palate on the right side, cleft of secondary palate with median position of the vomer.

Spine: *spina bifida occulta* and lumbalization of the first sacral vertebra.

Limbs: multiple anomalies of fingers and toes. Talipes equino-varus.

Normal psychomotor development. Normal karyotype: 44 XY.

The following surgical procedures were performed in the next two years: primary osteoplasty of primary palate (S c h u h a s t e r operation), operation of syndactyly of both hands, of coloboma and of dermoid.

The boy is now 3 years old. Dermoid has reccurred and facial asymetry is still present due to uneven position of the orbits, hypoplastic nostril and mild malar and maxillary hypoplasia. Caries of all teeth is due to congenital **hypoplasia of enamel** (Fig. a, b). Further surgical treatment is to be continued.

Fig. 3a

Comments

Apart of unusually big dermoid with strong tendency to grow and reccur after its removal, the boy is affected with other multiple anomalies and this case may be regarded as an example of facio-vertebral-digital dysplasia with epibulbar dermoid. It seems to represent the most extensive clinical manifestation of Goldenhar's syndrome, though atypical in one respect — lack of auricular involvement. Vertebral anomalies may be more frequent than reported.

In the absence of any signs of neurologic deficit there are no apparent indications for x-ray of the spine. Our child was neurologically normal, his spine being examined only as a diagnostic investigation of vertebral component of the syndrome.

Particular anomalies seen in our patient can be related to another known syndromes resulting from developmental disorder which arise in the course

of the 6th—8th week of embryonic life during differentiation of structures of mesodermal and ectodermal origin (1). It seems, therefore, that the most pathognomic component of Goldenhar's syndrome is ocular dermoid. There is no adequate explanation of its pathomechanism except that it may represent an abnormal differentation of the dermis under the alternating influence of ocular and cephalic centers of organization (5).

Our case differs from the typical Goldenhar's syndrome in the fact of oro-nasal instead of auricular involvement. It may be that nosologic process occasionally affects facial development along the groove between the fronto-nasal and maxillary processes instead of typical location along the groove between maxillary process and mandibular arch. We have found in the literature another case similar in the above respect (8).

Etiology is unknown. No chromosomal abnormalities have been observed and there seems to be no inheritance of the syndrome.

Fig. 3b

Fig. 3a, b. — Case 2, age of 3 years

SUMMARY

Two cases of Goldenhar's syndrome are reported. One is typical, with epibulbar dermoid, preauricular appendages, anomaly of external auditory meatus and macrostomia. The second case with multiple anomalies of the face, spine and limbs represents the most extensive clinical manifestation of the syndrome and is atypical in one respect — in the absence of auricular involvement.

It seems that the most pathognomonic component of Goldenhar's syndrome is ocular dermoid.

RÉSUMÉ

Syndrome de Goldenhar — forme typique et atypique

Jaworska M., Dudkiewicz Z.

On fait le rapport sur deux cas du syndrome de Goldenhar. L'un est typique: dermoïde épibulbaire, excroissances préauriculaires, déviations du conduit auditif externe et macrostomie. L'autre cas, avec de nombreuses déviations de développement de la face, de la colonne vertébrale et des extrémités, présente une vaste manifestation clinique du syndrome de Goldenhar; celui-ci est atypique d'un point de vue: les anomalies des oreilles manquent. — Il semble que le dermoïde oculaire est le facteur principal pathognomonique du syndrome de Goldenhar.

ZUSAMMENFASSUNG

Das Goldenharsche Syndrom — typische und atypische Form. Ein Bericht über zwei Fälle

Jaworska M., Dudkiewicz Z.

Die Autoren berichten über zwei Fälle des Goldenharschen Syndroms. Einer ist typisch: epibulbäres Dermoid, präaurikuläre Auswüchse, Abweichungen im äusseren Gehörgang und Makrostomie. Der zweite Fall, mit zahlreichen Entwicklungsabweichungen des Gesichtes, der Wirbelsäule und der Gliedmassen, ist eine sehr umfangreiche klinische Manifestation des Goldenharschen Syndroms, in einer Hinsicht ist er jedoch atypisch: in dem Fehlen von Ohrenabweichungen.

Das Augendermoid scheint die hauptsächliche pathognomonische Komponente des Goldenharschen Syndroms zu bilden.

RESUMEN

Síndrome de Goldenhar — forma típica y atípica. — Reporte sobre dos casos

Jaworska M., Dudkiewicz Z.

Se reporta sobre dos casos del síndrome de Goldenhar. Uno de ellos es atípico: dermoide epibulbar, excrecencias preauriculares, desviaciones del meato auditivo externo y macrostomias. El otro caso con numerosas desviaciones en el desenvolvimiento de la cara, de la columna vertebral y de las extremidades, es una manifestación amplia del síndrome de Goldenhar, pero es atípico en un respecto: la ausencia de las desviaciones auriculares.

Parece que el dermoide ocular es el factor principal patognomónico del síndrome de Goldenhar.

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Dr. M. Jaworska, Kasprzaka 16, Warszawa, Poland

University Hospital of Stomatology, Rostock (GDR)
Director Prof. Dr. sc. med. E. M. Sobkowiak
Department of Surgical Stomatology and Maxillo-facial Surgery
Head MR Prof. Dr. sc. med. Dr. A. Andrä

THE FULL THICKNESS SKIN GRAFT FOR PRIMARY REPAIR OF MALIGNANT FACIAL TUMOURS

A. ANDRÄ

1. THE PROBLEM

Although statistics disclose a relatively low incidence of malignant tumours in the facial region, their therapy is — due to their localization — of special importance, because their radical removal impairs not only the functions of the oro-facial system, but often the psychic attitude of the patient, to a considerable extent. If the excision of the tumour in healthy surrounding skin has been successful, primary postoperative repair of the soft tissue defects in the face, should certainly be attempted. The reconstruction can be carried out by plasty of near- and distant flaps and also by free tissue grafts. One or the other method is selected according to localization, type and expansion of the tumour, as well as according to size of the defect requiring surgery.

Good results may be achieved with plasty of surrounding flaps in the facial region especially in respect of function and esthetics, provided that in the vicinity of the defect there is enough sufficiently vascularized material available, which can be satisfactorily shifted. Extensive scar regions with restricted elasticity of the soft tissues, or skin regions damaged by diseases or therapeutic measures limit, however, this procedure (2). If direct plasty of distant flaps ["Pseudowanderlappen" according to Zoltán (8)] is not considered to be indicated in such cases, free skin grafts are the suitable procedure for primary repairs.

2. MATERIAL AND METHODS

2.1 The skin graft in the facial region

The free skin graft should take over all physiologic properties of the local tissue as much as possible, in the facial region this applies chiefly to function and esthetics. The full thickness skin graft complies with these demands best (1). As favourable as the results may be, the take is rather problematic, especially if it is a matter of larger defects in the region of mobile facial parts

or even of exposed bone parts. Although good blood supply at the recipient site favours the chances of the full thickness skin graft, exact preparation of the graft, close contact with the substratum, immovable fixing at continuous pressure and the prevention of liquid accumulation under the graft, establish important conditions for success.

The back part of the ear, the soft tissues above proc. mastoides and the supraclavicular region as well as the upper eyelid, should be considered as donor sites of full thickness skin grafts because this material complies best with the properties of the facial skin. At larger defects, the abdominal skin can also not be underestimated as donor site.

The blood supply of the graft starts from the bed of the graft after 24—48 hours, but the actual blood circulation in the ingrown capillaries begins on days 7—8. After 10—12 days the process of the take is clinically closed. A thin layer of subcutaneous- and fatty tissue forms in the course of several months and thus the graft becomes mobile on the substratum, adapting itself more and more also to the level of the surrounding skin. The sensoric reinnervation starts within 3—6 months and is concluded after 1—1½ years. The first to return are the senses of feeling and pain, later follows the feeling of warmth, evenly in the entire graft. The sweat glands also reassume their function after 1—2 years (4). Examinations disclosed that the glands and hair follicles contained in the cutis remain intact and even part of the vessels of the graft survives the grafting.

2.2. Full thickness skin graft in predamaged tissue

The use of full skin grafts in the irradiated field of operation still remains a problem. Schmid (5) managed the take of large skin grafts after the acute radioreactions subsided. Patients with chronic radiodermatitis, in which malignant tumours formed after many years of latency period in the radiogenically burdened tissue, are more frequently asking for treatment. In the start, these tumours tend to expand quite superficially. Their tendency to grow into depth is rather small.

Patient 6 (Tab.):

A female patient aged 60 years — in 1930 intensive x-ray irradiations of the face and neck, due to "excessive hairiness and freckles" — in 1933 "cutaneous tumours" in the region of both checks, which heal slowly. In 1955 renewed x-ray irradiation due to "proliferation" on the chin.

19. 8. 1968 hospitalization. Typical skin changes at chronic radiodermatitis with flat ulcer in the chin region (histology: cornified squamous cell carcinoma).

23. 8. 1868: excision of the tumour down to the jawbone — primary plasty of the defect by means of full thickness skin graft (donor site: mamma). The patient was without relapse, no indication of metastasis (Fig. 1—2).

Carcinoma arising from lupus may be formed by two important etiologic factors: by the specific chronic inflammatory process and by the x-ray irradiation of lupus vulgaris. After an unobtrusive process of many years, the ma-

lignant tumour develops in the thus predamaged soft tissues. At first it expands superficially without any considerable inclination to form metastasis. At its radical removal it is endeavoured to excise as much of the surrounding tissue as possible and to substitute it with healthy skin. It is, however, not always possible to prevent progression of lupus vulgaris by the operation alone. Thus

Fig. 1: Carcinoma at chronic radiodermatitis

lupomas may be observed in the grafts, more seldomly, however, in skin graft (5).

Although the vessels in tissue burdened by radiation are pathologically changed by fibrosis of the wall and their number is reduced, it is possible to prove greater blood supply due to the widening of the capillaries and better functioning of the vessels present. Thus chronic radiogenically changed tissue in the facial region, represents no contraindication for the application of skin grafts unless it is a matter of deep-seated postoperative defects (3). Many authors are of the opinion that at chronic radiodermatitis the skin regions should be even completely removed for prophylactic reasons and that they should be substituted by full thickness skin grafts. In many cases, however, the patients are not prepared to undergo this operation and we are therefore in favour of therapy in stages, under strict observation.

2.3 The full thickness skin graft at exposed bone

According to general opinion, the skin graft is very demanding in respect of the graft bed.

Its application is therefore only recommended if the blood supply at the recipient site is satisfactory enough. Zoltán (8) uses it only "for repair of smaller skin defects on certain parts of the body, requiring operation (eyelids)". The results of other authors disclose that skin grafts do not depend necessarily

upon subcutaneous connective tissue as the recipient site and that the take can also occur on musculature and fascia. It is often impossible to prevent in the surgical removal of malignant facial tumours that parts of the cranium viscerale (especially in the region of the lower jaw) must be exposed and laid bare of the periosteum in order to guarantee removal of the tumour in

Fig. 2: The take of the full thickness skin graft on bone freed of the periosteum

healthy skin on the base too. It is being doubted, whether the grafting of full thickness skin with the bone simultaneously exposed in the defect area, would be successful. Zoltán (8) sees in this a contraindication for the use of free skin grafts altogether, because "their take is uncertain and they do not protect the bone sufficiently against mechanical insultus and effects of the temperature". Other authors prepared the bone by decortication or trepanation of the cortex layer and wait with the skin grafting until the graft bed is filled with fresh granulation tissue. Some authors report on the successful primary take of a skin graft after excision of a malignant tumour in the region of the os frontale laid bare of the periosteum. Stallings and co-workers (7) proved in animal experiments that skin grafts take on the bare bone but that conditions are more favourable if the periosteum can be left there.

With three of our patients (patients 2, 6, 10 on the table) parts of the bones were exposed in the defect area after radical removal of the tumour. The surrounding soft tissues were considerably changed and did not allow therefore the plasty of adjacent flaps. We decided to graft the skin without previous treatment of the bone deprived of the periosteum. The graft was taken from the abdominal skin and prepared according to the known principles. We took special care to graft quickly, to achieve exact hemostasis, to perform careful suture and to exert constant pressure on the graft for a period of 12 days by means of a tied rubber-gauze compresse. The take of the skin graft

Table

Patient	Age in years	Diagnosis	Recipient site	Prior burden	Size of graft (in cm)	Donor site	Control period in years
1. ♂	66	Carcinoma	Submental region	Phosphor burns Preirradiation (1200 R SD*)	12 × 6	Abdominal skin	7
2. ♂	49	Carcinoma of the basal cells (relapse)	Mental region (on bones)	deep-X-ray-therapy (dose unknown)	4 × 3	retroaurical	6
3. ♀	48	Carcinoma of the basal cells (relapse)	Temple	deep-X-ray-therapy	4 × 3	retroaurical	6
4. ♂	64	Carcinoma	Cheek	Lupus vulgaris chronic radiodermatitis (dose unknown)	6 × 5	abdominal skin	5
5. ♂	43	Carcinoma	Forehead	Phosphor burns preirradiation (1200 R SD)	3 × 2	retroaurical	4
6. ♀	60	Carcinoma	Mental-submental region (on bones)	chronic radiodermatitis (dose unknown)	6 × 5	breast skin	4
7. ♂	58	Fibrosarcoma	Temple	deep-X-ray-therapy (dose unknown)	9 × 7	abdominal skin	3
8. ♂	60	Carcinoma	Cheek	Burns preirradiation (1200 R SD)	7 × 6	abdominal skin	3
9. ♀	62	Fibrosarcoma	Cheek	Lupus vulgaris chronic radiodermatitis (dose unknown)	5 × 4	abdominal skin	2
10. ♂	59	Carcinoma	Cheek-region of lower jaw (on bones)	Lupus vulgaris chronic radiodermatitis (dose 18 000 R SD)	6 × 6	abdominal skin	2
11. ♀	44	Carcinoma of the basal cells	Temple	Preirradiation (1200 R SD)	5 × 4	abdominal skin	1
12. ♀	35	Malignant melanoma	Temple-cheek	Preirradiation (5000 R SD)	7 × 6	abdominal skin	0,5
13. ♀	62	Carcinoma	Cheek	Lupus vulgaris chronic radiodermatitis (dose unknown)	6 × 5	abdominal skin	0,5**)

*) SD = superficial dose, **) = flap partly necrotized

was smooth. Controls after 4—6 years disclosed that the graft on the bone base was mobile with no difference of level and colour in the vicinity. Re-innervation was complete.

3. RESULTS AND CONCLUSIONS

We used the full thickness skin graft in the facial region so far in 27 patients, in 13 cases for primary plasty of defects at malignant tumours. With 24 patients the take was undisturbed, 3 times the graft was partly necrotized. Once due to infection and twice due to insufficient compression. In all cases the skin was grafted on a fresh operational wound.

The mean age of the tumour patient was 54.6 years, the youngest was 34, the oldest 66 years. In 7 cases it was a carcinoma, in 3 a basal cell carcinoma, in 2 a fibrosarcoma and once a malignant melanoma (Tab.). Most of the tumours were formed on "predamaged territory" (lupus vulgaris, sequels to irradiation, burns). No suitable soft tissue material was available for plasty of adjacent flaps and we did not consider plasty of a distant flap to be indicated. The mean period of control amounted to 3.4 years. There have not been any relapses of metastasis so far (Tab.).

Our experiences with the full thickness skin graft in the facial region, may be summed up as follows:

1. The skin graft may be used for repair of larger defects in all regions of the face. Its small secondary shrinkage prevents to a great extent functional disorders.

2. The full thickness skin graft does not require subcutaneous tissue: the take occurs also on the musculature, the tendons and the bones deprived of the periosteum. Good vascular supply may be here — especially with regards to the lower jaw — a favourable factor.

3. If the tumour is pre-irradiated by a reasonable dose (1200—1500 R), there is no unfavourable effect upon the recipient site or upon the take of the graft. Chronic radiodermatitis is no contraindication for the use of skin grafting.

4. The skin graft is a definite skin substitute. It should be therefore only used if the tumour can be removed with certainty in healthy skin.

5. The skin graft may be used alone or in combination with plasty of adjacent flaps for repair of the defect. The favourable results in the face recommend further use.

H. S.

SUMMARY

The study reports on the successful use of full thickness skin graft for primary repair of defects at malignant tumours in the facial region. The good conditions of the recipient site permit the grafting of skin even in the region of the musculature, fascia and predamaged regions of soft tissue. It can be proved that the skin graft takes even on bone laid bare of the periosteum. The achieved results should contribute to further indications for grafting skin of full thickness in the facial region.

RÉSUMÉ

Greffe de peau destinée à la recouverture primaire du défaut en cas de tumeurs malignes de la face

Andra A.

Le travail renseigne sur l'utilisation heureuse de la greffe de peau d'une épaisseur totale destinée à la recouverture primaire des défauts chez les tumeurs malignes de la face. A la face, il y a des conditions les plus favorables pour l'adhésion des grandes greffes de peau aux muscles et aux fascias. On a démontré que la greffe de peau qui est trés exigeante adhérait bien même sur l'os privé de périoste. Les résultats obtenus contribuent à augmenter le nombre d'indications pour l'utilisation de la peau d'une épaisseur totale pour les transplantations dans la face.

ZUSAMMENFASSUNG

Das Vollhauttransplantat zur primären Defektdeckung bei bösartigen Gesichtstumoren

Andra A.

Die vorliegende Arbeit berichtet über die erfolgreiche Anwendung von Vollhauttransplantaten zur primären Defektdeckung bei bösartigen Tumoren im Gesichtsbereich. Die guten Voraussetzungen der Empfangsstelle gestatten die Transplantation grosser Vollhautlappen selbst im Bereich von Muskulatur, Faszien und vorgeschädigten Weichteilbezirken. Es kann der Nachweis erbracht werden, dass der anspruchsvolle Hautlappen auch auf periostenblösstém Knochen gut zur Anheilung kommt. Die erzielten Ergebnisse sollten dazu beitragen, die Indikationsstellung für eine Vollhauttransplantation im Gesichtsbereich zu erweitern.

RESUMEN

Injerto cutáneo para el primer recubrimiento de los defectos en tumores malignos de la cara

Andra A.

El trabajo informa sobre el éxito en el empleo del injerto de la piel de espesor total para el primer recubrimiento de los defectos en los tumores malignos en la cara. En la cara se presentan las mejores condiciones para la adhesión de los injertos cutáneos grandes a los músculos y a las fascias. Fue demostrado que el injerto cutáneo, que es muy exigente, adhiere bien al hueso desprovisto del periostio. Los resultados obtenidos contribuyen al aumentar el número de las indicaciones para el empleo de la piel del espesor total para las trasplantaciones en la cara.

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Prof. Dr. sc. med. Dr. A. Andrä, Strempelstrasse 13, 25 Rostock, DDR

4th **International Congress on Burn Injuries**, 15—21 September 1974 Buenos Aires, Argentina. Organized by the Argentine Chapter of the International Society for Burn Injuries. — Avda. R. Sáenz Peña 1110, 2do. piso.

Preliminary Scientific Programme

The Scientific Programme will take place on Monday, Tuesday, Thursday and Friday of the Congress week, from 8:30, a.m. to 6:30 p.m.

Seven official subjects have been chosen: 1. Acute Phase of the Burn, 2. Metabolic Response, 3. Infection — Sepsis, 4. The Burn Wound and Wound Healing, 5. Prevention — First Aid and Education, 6. Skin Replacement, 7. Reconstruction.

Two subjects will be discussed each day in Plenary Sessions (morning and afternoon) and Work Shops will take place in the morning.

Committees of experts in each topic, with a coordinator, will meet during three mornings from 8.30 to 10 to study and discuss the following subjects: A) International Classification, B) Collections of Data — Use of Computers, C) Organization of Burn Centers.

Their conclusions will be presented by the coordinator in a main session and will be considered recommendations of the Congress.

A special auditorium will be provided from 8:30 to 10:00 a.m., so that anesthetists, nurses, dieticians, occupational and physical therapists, and social workers, will be able to present and discuss their papers.

Besides, they are all invited to participate in the main sessions.

Once the afternoon main session is finished, participants will dispose of one hour to see and project scientific films on the specialty.

Exhibitions: — Scientific — Prevention — Cultural — Commercial.

Institute of Experimental Biology and Genetics, Czechoslovak Academy of Sciences, Prague (Czechoslovakia)

TISSUE BANKS AND THE PROBLEM OF TRANSPLANTATION

M. HAŠEK

A wider clinical use of organ transplantation has been as yet limited by various factors. Of these, two are most important: immunological incompatibility of the grafts and the supply of physiologically acceptable donor organs and tissues. I would like to touch briefly upon the first of these topics.

In the past 20 years, research with respect to immunological problems of transplantation has made impressive progress. Research on transplantation received its major impetus from surgeons who wanted to substitute large areas of skin in severely burned human patients with a skin allograft. Intensive research on skin homografting has been initiated during the World War II. In the past decades, interest of the clinicians has shifted from skin allografts to organ allografts, such as kidney and others. A successful allotransplantation model has been developed, under experimental conditions, in animals. Any organ or any tissue can be transplanted when immunological tolerance is produced. However, the induction of immunological tolerance has not as yet proved feasible in the human. Transplantation studies hitherto performed on experimental animals have provided an understanding of how and why allografts failed rather than were conducive to a successful clinical transplantation. Nevertheless, many new major developments have been made in the past decade. Transplantation in man has revealed that allografts of a large organ, e.g. kidney, can survive in the recipient much longer than skin allografts. Over 3,000 human kidneys had been transplanted in various transplantation centres throughout the world, one-half of the grafts being taken from living human volunteer donors (1). In addition, non-specific immunosuppressive procedures have been introduced, for example, treatment with azathioprine and prednisone combined with antilymphocyte serum (2). Finally, the immunogenetic selection of donor and recipient for transplantation has become one of the approaches which offers great promise for considerable advances in transplantation treatment.

At the present time we are enjoying the exciting era of transplantation optimism. Apart from the kidney, the application of transplantation to other

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This paper was presented at the Conference concerning the Conservation of Cells, Tissue and Organs held in September 1972 at Chlumec upon Cidlina (Czechoslovakia).

organs is now being approached. Experiments on transplantation of the heart, lungs, liver, pancreas and stomach are under way both in experimental animals and humans. Liver transplants appear to show a startling behaviour, liver allografts in pigs can survive permanently and produce immunological enhancement of the transplanted skin and kidney (3). Liver transplantation is performed also in man, cadaver donor liver allografts being used to substitute this unpaired organ.

It is often extremely difficult to suppress transplantation immunity in man without severely impairing the normal host defences against infections. Yet, there is no doubt at present that transplantation immunity can be abated in man. It is, however, difficult to predict the way to go on. It seems to me that the greatest success would be a combination of non-specific immunosuppression with specific immunosuppression in human patients. Then we could hope to benefit from the mechanism of immunological tolerance and other immunological phenomena in transplantation treatment. With the present theoretical knowledge and technical possibilities, organ transplantation will not find definite application at the practical therapeutic level unless painstaking laboratory efforts become the commonplace clinical measures. Clearly interest in transplantation treatment will persist and strengthen even if the optimism temporarily fades. Transplantation of the large organs will always remain a big operation. Yet, transplantation treatment may concern also other branches of medicine, for example, transplantation of a cell clone producing the enzymes that are missing in the body of the recipient, etc.

Transplantation of the cornea has become a classical transplantation treatment. There are some immunologically privileged sites in the body where the transplant does not evoke an undesirable immune reaction. This is undoubtedly the case with the cornea. More than 80% of the cornea allografts remain permanently in situ and are not rejected. Also, cartilage and bone are classical transplantation materials to date. Cartilage displays greatly reduced antigenicity and the bone survives thanks to the substitution with the donor bone tissue. A bone transplant serves de facto as a supporting framework for the restoration of the own bone.

Despite the tremendous development of "transplantology" in the past twenty years, the practical results are still contradictory and a further extension of transplantation in clinical conditions is difficult to assess. Transplantation treatment has no doubt taken root in the clinic and continuing research into the immunological problems together with investigation into better techniques of organ preservation are essential for progress in this field.

In conclusion, on the occasion of the Twentieth Anniversary of the First Tissue Bank in Europe, let me congratulate all the members upon the results obtained so far and wish every success in further work to the initiator and Head of the Bank, to Doc. Rudolf Klen. The best wish will be, but it is still a science fiction, that the Tissue Bank at Hradec Králové should succeed not only in preserving tissues and organs but also in fabricating them from living cells in some kind of culture system.

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Prof. Dr. M. Hašek, DrSc., Flemingovo nám. 2, Praha 6, Czechoslovakia

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The "Second International Symposium on Plastic and Reconstructive Surgery of the Head and Neck" will be conducted June 8—13, 1975 in Chicago. The symposium is sponsored by the American Academy of Facial Plastic and Reconstructive Surgery, Inc.

For further informations contact:

John T. Dickinson, M.D., Pittsburg 412/281-1565

James R. Leonard, M.D., Philadelphia 215/735—1134

Jerry End, BH&S 215/375—4311

Scientific Research Laboratory of Experimental Immuno-Biology Academy of Medical Sciences, Moscow (USSR)

ON THE IMMUNOLOGICAL PROPERTIES OF PRESERVED TISSUES

N. G. ARTSIMOVICH

The preservation of the structure and biological properties of tissues during conservation, is usually achieved in two principle ways: through deep-freeze (—79^0 —196^0 — 269^0 C) with the use of protective means and by placing tissues in a liquid nutrient at a low temperature (+ 4^{0}C).

The first of these methods is based on the total cessation of metabolic processes in cellucar tissues subjected to the deep freeze process. The second method is founded on maintaining the activity in the cell at a low metabolic rate.

In the opinion of the majority of researchers, the preservation of bone tissue by freezing and drying appears wholly justilable (Y. E. Barkov, R. E. Billingham, R. Klen, P. P. Kovalenko, M. E. Panova, E. N. Sautin, A. Smith, et al.).

Preserved allografts appear to be good stimulators of regeneration. The active process of rebuilding the immunizing reactions of grafted tissue takes place in the grafts of deeplyfrozen bone tissues, particularly of the epiphis, where bone marrow cells are present, and to a lesser extent in the transplanted grafts of freeze-dried fragments.
(A. S. Imamaliev, E. M. Mayerson, R. G. Burwell et al.).

Patients with various cardio-circulatory disturbances have with great success received transplanted freeze-dried blood vessels.

Although in all cases the original allografts are rejected after a period of time (after the recipient organism regenerates its own) nevertheless, freeze-dried vessels are found to act as a suitable biological prosthesis, causing forth only a weak, immunological reaction from the recepient. (M. V. Bilenko et al., A. A. Vishnevski.)

The preservation of bone marrow is done either in a liquid medium at a temperature of +3^{0}C, or at deep freeze (—78^0 — 196^{0}C). (H. G. Sushko, A. G. Fedotenkov.) In the first case, bonemarrow cells can be preserved only for one week, but the method is simple and widely used.

This paper was presented at the Conference concerning the Conservation of Cells, Tissue and Organs held in September 1972 at Chlumec cn Cidlina (Czechoslovakia).

The important advantage of this, is in the possibility to make a bone marrow bank and the possibility of carying out a transfusion with due account of the antigene variations.

Promising is a method for the separate storage and accumulation of fragments of bone marrow. In all methods of preservation, transfusion of allogenic bone marrow causes an active immunity as a response. (E. A. Zotikov, R. V. Petrov, et al.)

Recently in the problem of biological incompatibility in the use of allografted tissues, attempts have been made to remove or weaken antigene properties in the grafts by one of the three methods mentioned.

In all our cases of allografts and pericardium frozen at low temperature down to the temperature of liquid helium, as well as that subjected to freeze-drying and chemical processing were rejected.

By the use of reliable immunological methods, as the reactions of regional lymph nodes, and "Second Set" reactions showed the preservation of the transplanted antigenes in the conserved tissues.

In all our cases, the allografted skin and pericardium, which remained in the process of preserving life properties formed in the blood of the recipients specific hemoglutinines, adding weight to regional lymph nodes, and to the number of immunized compatible cells; while at the same time they eliminated the second grafts at a faster rate.

Nonliving freeze-dried transplants are found to stay longer on damaged surfaces, stimulating tissue regeneration. Also in the blood of the recipient full and partially fluid hemoglutinines are formed which lead to an increase of the regional lymph nodes.

Still, the quantitiy of immunizing incompatible cells in the lymph nodes were two or three times less than after transplantation of the living allografts, thus clearly giving evidence of lower sensitivity in the recipient. (N. G. Artsimovich, N. G. Suhkomovskaya, N. G. Artsimovich et al.)

SUMMARY

I. The deep-freezing of transplants at low temperatures —78°, —196°, —269 °C) through the use of glycerol and dimethylsulphoxide enables them to live for several months.

2. The deep-freezing of grafts at temperatures higher than —50°C, freeze-drying, and processing in a solution of formaline (1%) and alcohol (10%), in spite of the loss of life, preserve the plastic properties of the allografts and stimulate organogenesis.

3. As the allografts, that have died in the process of conservation, call forth an active sensitivity from the recipient organism, it is important to keep in mind this ability before repeating either transplants or blood transfussions, in order to prevent allergic reaction and shock.

N. G. Artsimovich, Baltyiskaya 8, Moscow A 315, USSR

Ironworks-District Hospital, Miskolc (Hungary)
Department of Otorhinolaryngology
Director S. Ditrói, M. D.

SURGICAL CORRECTION OF ALOPECIA

S. DITRÓI

Plastic surgeons have shown increasing interest in the surgical correction of alopecia all over the world (first in America and now also in Europe) ever since Orentreich described in 1959 his method of transplantating hair by the punch autograft technique.

Alopecia, a collective term for the loss of hair, has a number of varieties as regards both its aetiology and its manifestations. Instead of going into the details of its intricate classification I want to refer to the up-to-date classification of Braun-Falco (1966). Essentially, all classifications distinguish between irreversible and reversible baldness and, within the latter, between diffuse and local varieties (Vadász, 1972).

SURGICAL INDICATIONS

Owing to its frequency, *male-pattern alopecia* occupies the first place in this respect. The development of this anomaly, regarded as a phenomenon governed by genetic and hormonal factors, requires the presence of androgens and the existence of hereditary predisposition (Ludwig, 1962, 1967).

Transplantation of hair is further indicated in cases of *women's diffuse loss of hair,* a disorder that has commanded increased interest during the last ten years in the world.

The majority of authors seem to concern themselves chiefly with male-pattern alopecia and to disregard *alopecias of traumatic origin.* Owing to their unusual localization and unnatural appearance, circumscribed injuries of the hair-bearing scalp (burns caused by fire or electric current; corrosive substances; scalping) are extremely disturbing not only for children and women but for men as well; it is therefore necessary to widen the range of indications for hair transplantation in this direction as has been emphasized by Mühlbauer (1970), a view to which we subscribe.

Surgical intervention is indicated by numerous factors if baldness has already developed. Wigs are used to conceal the denuded areas of women, an expedient hardly applicable in the case of children.

Parts of hair pasted on the bald areas of males are not safely fixed, interfere with their work, private life and sports. Some individuals do not tolerate the adhesives with which the borrowed hair is immobilized: sensitized, they develop eczemas.

Most plastic surgeons engaged in hair transplantation attach importance to the psychic consequences of alopecia. It was stated by Arouete (1967) that, although the majority of bald persons accept loss of hair and the resulting alopecia as "natural" concomitants of advancing age, in certain cases

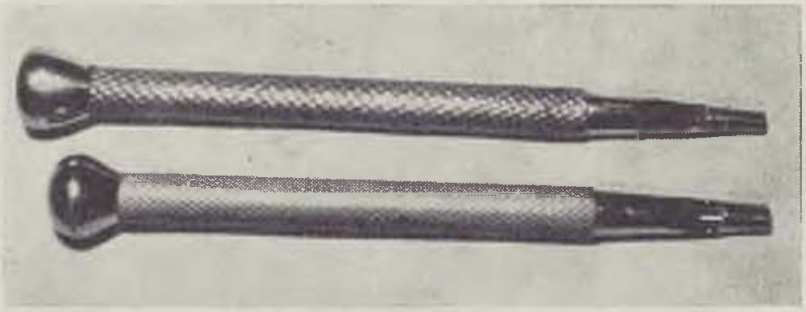


Fig. 1. Tool (punch) for the preparation of the recipient site (diameter 3 mm.) and for the removal of the plug to be transplanted (diameter 4 mm)

it nevertheless gives rise to grave depression and may become a veritable obsession; individuals of this description will be the first to resort to the new therapeutic method.

It is, according to Unger (1971), a popular misconception that those seeking this new procedure are mentally unbalanced. On the contrary: they wish to become normal figures of everyday life, to become as they used to be before.

Theoretical basis of hair transplantation

It is commonly known that males afflicted with androgenic alopecia retain hair in the temporoparietal and occipital regions in the form of the so-called "banker's skull". Performing homologous transplantations, Orentreich (1959, 1970) found that hairbearing pieces of skin did not lose the hair after having been transplanted to bald areas. The phenomenon that the growth of hair continues in the follicles irrespective of localization was termed by him "donor dominance". Reversing the experiment, Orentreich transplanted hairless skin from bald areas to hairy regions: hair failed to grow from these transplants. He was the first to demonstrate in this convincing manner that the viability of hair follicles is determined by their origin and not by their destination.

Principles of hair transplantation

1. The retained rim of hair at the donor site, i. e. in the temporoparietal and occipital regions, should suffice to cover the bald area.

2. Hair at the donor site should be adequately thick: there should be at least eight hair bulbs per mm^2 (Unger).

3. Several sessions are necessary in order to completely cover the recipient area, their number depending on the degree of alopecia. The psychic aptitude of individuals soliciting surgical management has to be estimated to find out whether they have patience enough to undergo a series of operations. There are certain other requirements in connection with alopecias of traumatic origin:

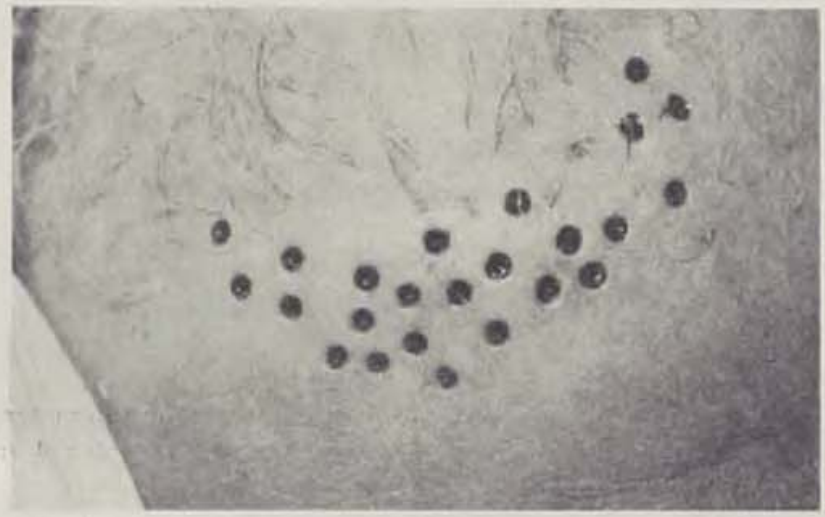


Fig. 2. The recipient site prior to transplantation

Fig. 3. Plugs taken from the occipital region

4. The recipient site should be adequately vascularized.

5. In cases of localized scarring alopecias the cicatrix should be soft and capable of being slided along its base.

6. The interval between trauma and hair transplantation must not be shorter than a year.

7. Likewise at least a year should elapse until the correction if a free graft was used at the time of traumatization; this is necessary in order to

allow the formation of an adequately thick fatty layer between the implant and the pericranium (Mühlbauer).

If, owing to the manner in which the alopecia of traumatic origin has cicatrized, these requirements are not satisfied, it will be necessary to excise the scarred area and replace the defect by free skin graft before the transplantation of hair.

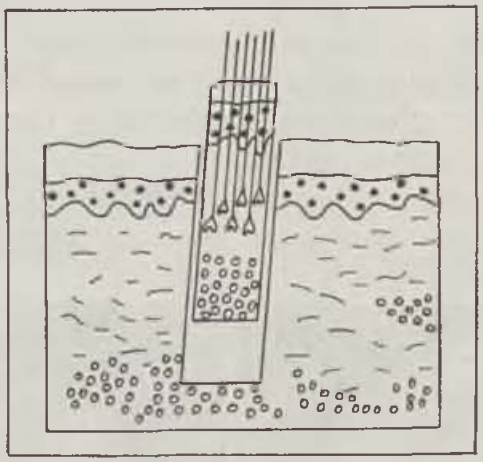


Fig. 4. The material is removed in the direction of natural hair growth.

Fig. 5. Transplantation

SURGICAL TECHNIQUE

Reduction of the denuded area. As a preliminary operation, the size of the alopecic region has to be reduced in cases of baldness due to trauma. Essentially, it consists in the excision of 2—3 cm strips and the closure of the defects by sutures. The dilatability of the scalp is utilized in such cases, and the procedure may be repeated several times.

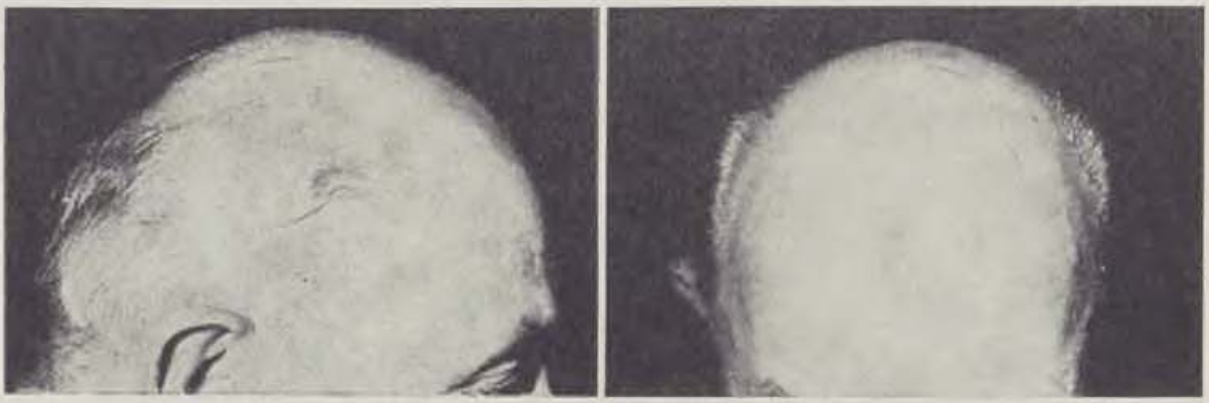
Preparation of the operative area. Owing to the risk of infection the hair-bearing scalp is not shaved but clipped short. Prior to the operation, the hair

is washed with Sterogenol*). Not utilized longer hair (that of women in particular) is braided by means of thin gauze-bands. The patient is in a prone position during the operation, the forehead being propped up by a pad. The operation takes 20 to 30 min. and does not seem to be a major stress for the patients.

Before starting the operation we employ a dermograph to mark the normal borderlines of the hair-bearing scalp.

Anaesthesia is local. Most authors use adrenaline-free solutions in order not to decrease blood circulation, a justified usage. We have so far not experienced undesirable effects, necrosis, produced by adrenaline at the correction of non-traumatically induced alopecias.

Preparation of the recipient area. Employing a punch as illustrated in Fig. 1, make cylindrical holes of 3 mm diameter at the boundary of the other-



Figs. 6, 7. Conditions before the operation

wise hair-bearing scalp and over the recipient area (Fig. 2). The plugs removed from this area are discarded.

The taking of grafts from the donor area. Cylindrical plugs of 4 mm diameter are punched out of the hair-bearing temporoparietal and occipital regions of the scalp (Fig. 3, 4), and placed in Petri dishes filled with moderately warm physiol. saline. The plugs are bored from the said regions by the use of slight pressure on the punch combined with a twisting motion; the cut is initially vertical to the scalp surface and is then angled.

Grafting. Plugs from the donor area are placed into the 3 mm punch holes of the recipient area; they become anchored there owing to the difference in the diameters of the plug and the hole (Fig. 5). When implanting the plugs one should pay careful attention to the direction of natural hair growth which forms a forward open acute angle with the skin surface.

Precipitation of fibrin, starting after a few minutes, facilitates the anchoring of the grafts. The majority of authors are in favour of a 4-mm plugs which still ensure adequate plasma diffusion. Plugs of larger diameter often result in fibrotic reactions with later follicular impairment.

*) Alcoholic solution of cetylpyridinium bromate.

Lily (1970) observed pronouced signs of blood circulation on the third postoperative day: new capillaries emitted by the recipient site had gradually come into anastomic contact with the vessels of the implanted plug.

Surgical plan. There is no rigid rule determining the number of operations necessary for the correction of alopecias. It depends on

the extent of baldness in each individual case;

the physical and psychic condition of the individual;

the length of available time (Vogt and Neumann 1968).

Figs. 8, 9, 10. Six months after the two operations

About 40 to 60 plugs are transplanted per session. Extensive baldness may require the grafting of 500—600 plugs which means a series of 9—10 operations. It makes no difference at which point of the recipient area grafting is started. Our practice is to begin with the natural line of the frontal hair because the aesthetic impression on the patient at the developing growth of new hair encourages him to go on with the operations.

Care of the donor area. The majority of authors do not close the 4-mm punch holes of the donor area by sutures. The defects heal without notable cicatrization and, except for a thinning of the hair, produce no essential aesthetic changes. Bearing in mind subsequent transplantations and aware of the motility of the hair-bearing scalp, we close the defects with running (interrupted) sutures thus preventing the formation of circular cicatrices.

Thickening of the hair ("filler sessions"). Results are cosmetically satisfactory only if the originally bald area is covered by thick hair. This cannot be achieved by a single operation because nourishment by way of diffusion is inadequate if the plugs are too closely implanted. We leave, therefore, gaps of 2—3 mm between them, the result being, however, unsatisfasctory from a cosmetic point of view.

We have accepted Unger's suggestion that no new intervention should be made in the area of operation before six weeks have elapsed. After this interval fresh plugs from the donor area are inserted between and above two earlier implants.

Postoperative period. The wound is postoperatively sprayed with an antibiotic solution. Preparations inhibiting oxygenation (Plastubol) are not employed for this purpose. The surgical area is dressed with a sheet of sterile gauze which is then changed every other day. We prevent exsiccation of the grafts by sterile containing an antibiotic substance.

It is necessary to emphasize that, if the operative technique is correct, the hairs will fall out of the plugs 2 to 8 weeks after their insertion, a natural phenomenon. It is after another 8 to 14 weeks that a notable growth of new hair may be expected. On an average, each plug emits 6 to 12 hairs (Figs. 6 to 10).

COMPLICATIONS

Infections are rare. Unger estimates their incidence at 1 : 50 000. We observed no complications in connection with 8 transplanting sessions.

Bleeding. Haemorrhage can be arrested in most cases by mild pressure and the application of sterilized warm NaCl solution. Pulsating haemorrhage points to arterial lesion; if it occurs at the recipient site it is better to suture the wound lips than risk failure caused by bleeding which elevates the plug above the surface of the skin.

Palpebral oedema. We had one case in which, following the correction of frontal alopecia by punch autografting, the upper eyelid became oedematous. The oedema disappeared after a few days and was presumably the result of circulatory disturbance.

Paraesthesia. Lessening of sensation in both the donor and the recipient area is almost inevitable, a phenomenon due to denervation. Patients do but rarely raise complaints on this score, especially if forewarned and told that sensation would be restored after 6 to 12 months.

Arteriovenous fistula. This rare complication was observed by Souder and Bercaw (1970). It appeared in the temporal region after the 9th session. These authors emphasize the importance of tying up strongly bleeding vessels.

SUMMARY

The author presents an account of this experiences in connection with the surgical correction of baldness. Orentreich's punch autograft technique, introduced to Hungary by the author, has proved suitable for the surgical repair of alopecias of various origins including the androgenic male-pattern alopecia, and is particularly useful for a simple remedy of alopecias secondary to traumata.

Punch autografting has given highly satisfactory results; its indications and technical execution are discussed in detail.

RÉSUMÉ

Correction chirurgicale de l'alopécie

Ditrói S.

L'auteur présent les expériences dans la correction chirurgicale de l'alopécie. Il constate que la technique décrite par Orentreich et employée en Hongrie la première fois par l'auteur, se prête à la réhabilitation chirurgicale simple des alopécies de différentes étiologies, surtout de la "calvitie androgène des hommes" et de l'alopécie traumatique.

L'auteur expose en détail les conditions et la technique de l'autotransplantation par perforation, laquelle donne de bons résultats esthétiques.

ZUSAMMENFASSUNG

Chirurgische Korrektion der Alopezie

Ditrói S.

Der Verfasser berichtet über die Erfahrungen bei der chirurgischen Korrektion der Alopezie. Es wird festgestellt, daß die von Orentreich beschriebene — und vom Verfasser in Ungarn erstmal angewendete — Technik für die einfache chirurgische Rehabilitation der Alopezien unterschiedlicher Ätiologie, in erster Linie des „androgenetischen Haarausfalles bei Männern", sowie der traumatisch bedingten, geeignet ist.

Ausführliche Beschreibung der Operationsbedingungen und -technik der Perforationsautotransplantation, welche gute ästhetische Ergebnisse ergibt.

RESUMEN

Correccion quirurgica de la alopécia

Ditrói S.

El autor relata sobre sus experiencias obtenidas en la corrección quirúrgica de la alopécia. Establece, que la técnica descrita por Orentreich — por primera vez aplicada por el autor en su país — es apropiada para la simple rehabilitación quirúrgica de las alopécias originadas como consecuencia de las diferentes etiologias — por ejemplo la "calvicie androgenética" de los hombres, pero principalmente los traúmas.

Detalladamente hace conocer las condiciones y técnica de la operación de autotransplantación de perforación, la cual proporciona buenos resultados estéticos.

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Dr. Ditrói S., Vasgyári Kórház, Miskolc III., Hungary

NEWS

2nd Congress of the European Association for Maxillo-Facial Surgery will be held September 16—21, 1974. Zürich (Switzerland). — Secretariat: Congress and Convention Services, Hirschgraben 82, CH-8001 Zürich.

At their annual meeting, members of the Czechoslovak Society of Plastic and Reconstructive Surgely elected the following officers: President: V. K u b á č e k, M.D., Sc.D., Brno-Královo Pole, Berkova 34, Secretary: M. Fára M.D., Sc.D., Praha 10, Šrobárova 50.

Baylor College of Medicine, Houston, Texas (U. S. A.)
Cora and Webb Mading Department of Surgery
Division of Plastic Surgery

CORRECTION OF POST TRAUMATIC ENOPHTHALMOS

M. SPIRA. F. J. GEROW, S. BARON HARDY

In no other external area of comparable size are the injuries and residual deformities more variable and complex than those involving the orbit and periorbital tissues. Enophthalmos is one of the most difficult problems following midfacial fractures, particularly in cases of untreated "blow-out" injuries. Frequently this deformity is accompanied by a decrease in size of the palpebral fissure, a pseudoptosis of the upper lid with a depression in the upper lid sulcus, varying degrees of hypophthalmos, limited ocular motion, and diplopia. An increase in the overall size of the orbital cavity secondary to loss of orbital floor or medial wall continuity, a decrease in orbital content volume, and post traumatic fat resorption are almost impossible to correct fully.

Early operative intervention is important. This should be done as soon as the deformity is established as real and not secondary to periorbital swelling. The longer the delay the more difficult this condition is to correct. Full restoration of malar-maxillary contour, especially the eminence, can increase the appearance of an existing enophthalmos. Do not fully correct the contour when enophthalmos is severe. Attempt enophthalmos correction first, and later restore the external contour. The type of surgical approach and choice of implant amount, shape and placement are important considerations. Alloplastic implants are preferred over autogenous tissue, even when a communication with the maxillary sinus exists. Where there are large defects in the sinus or nasal cavity, autogenous bone may be utilized in the first of a multistage reconstruction.

Salient points during surgery include an incision in the lower lid skin crease, a wide dissection of the floor, involving lateral and lower medial orbital walls to a depth of at least 3 cm to 3.5 cms and, where possible, avoiding a direct opening into the maxillary sinuses. When a large defects is found following the dissection, Teflon sheets of thicknesses varying from .015 inch in an adult to .008 inches in a child are used to restore the orbital floor continuity. Where pure enophthalmos exists, it is most important to place the implant l a t e r a l l y instead of inferiorly (Fig. 1). Silastic rubber, either hand carved or prefabricated, is the preferred implant when bulk is necessary.

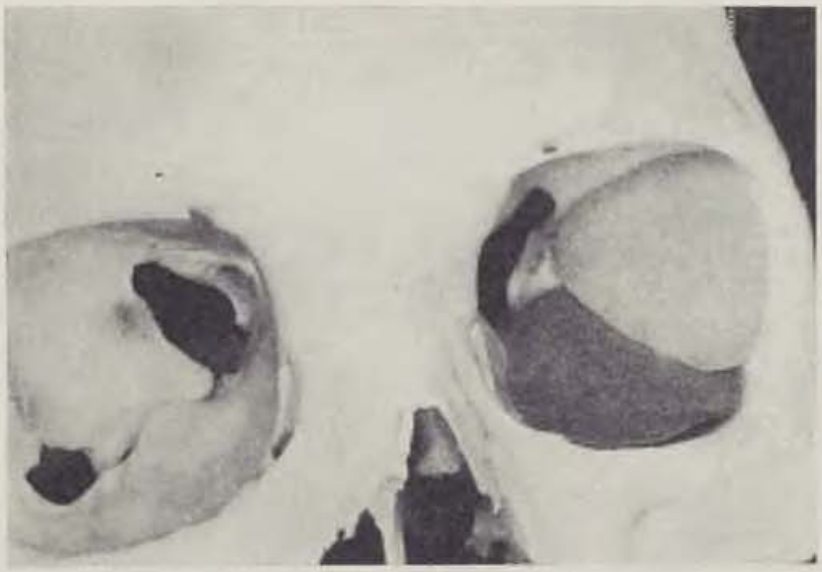

Fig. 1. Where enophthalmos alone is present, implantation is along the lateral wall. Where both hypophthalmos and enophthalmos are being treated, the support and augmentation are seen here, with both the lateral wall and floor implants employed

Fig. 2 a

Fig. 2. Typical case where enophthalmos and hypophthalmos are a problem. — a. — The large defect in the orbital floor, found on exploration. b. — Teflon, .015 inch thickness, appropriately shaped and carved, with fixation wires, being placed to reconstruct the floor

Fig. 2 c. Silastic® rubber implant appropriately carved, with sufficient bulk, placed along the lateral orbital wall

Fig. 3 a

Fig. 3 a, b. Preoperative view demonstrating persistent left enophthalmos with an upper lid sulcus depression and minimal hypophthalmos two years after facial bone fracture

Fig. 3 c, d. Eight months following reconstruction as outlined in Fig. 2

Fig. 3 d

Fig. 4 a, b. Preoperative views show both enophthalmos and hypophthalmos

Fig. 4 b

Fig. 4 c

Fig. 4 c, d. One year post-operative, showing correction obtained

The implant should nestle smoothly in the hollow of the lateral orbital wall and be anchored there with non-absorbable sutures. Similarly, hypophthalmos is corrected by the addition of implant to the orbital floor. The available periosteum should be closed (but not the orbicularis muscle), and followed by routine skin closure (Fig. 2). Two representative cases are shown in Fig. 3 and 4.

Except where there is no vision, the use of any material that can migrate, such as injectible silicone and glass beads, etc., is deprecated.

Two types of postoperative complications have been seen. When there was a failure to properly immobilize the implant, there was anterior migration with an impending extrusion which necessitated removal of the implants in two patients, 3 and 24 months following the insertion. Where extensive destruction of the orbital floor occurred and reconstruction was attempted with alloplastic material, recurrent periorbital and maxillary sinus infections were a problem in two of the patients in our series. Signs and symptoms cleared rapidly following removal of the implants.

In conclusion, hypophthalmos and enophthalmos as post traumatic orbital deformities present problems in reconstruction which tax the ability of even the most able and versatile plastic surgeons. Excellence in this area is difficult to obtain, and the final result sometimes falls short of the preoperative goal. The surgeon must aim to restore that which is restorable and recognize his surgical limitations in the severest deformities. A preoperatively well informed patient will not expect perfection.

Prof. M. Spira, M.D., 1200 Mouround Avenue, Houston, Texas 77025, U.S.A.

Priorov Central Institute of Traumatology and Orthopaedics
Ministry of Health of the USSR, Moscow (USSR)
Director Prof. M. V. Volkov, Academician
Laboratory of Experimental Traumatology and Orthopaedics
Head A. G. Lapchinsky, Dr. Med. Sc.

SOME QUESTIONS OF STATIC TISSUE CONSERVATION THEORY

S. S. FEYGELMAN

In the last ten years active elaboration of methods of transplantation has brought research workers, at first sight, to unexpected conclusions that employment of conserved tissues not only does not impair, but in some cases even improves the results when compared with those observed in transplantation of fresh tissues (Filatov, 1945; Lapchinsky, 1959; Lapchinsky et Lebedeva, 1960 and Filatov, 1965). In his paper "Homotransplantation of Bone as a Biological Problem", Govallo et al. (1970) wrote: "Up to the present, we do not know why conserved bone evokes a less intensive reaction of the organism, but the fact is well established."

This fact is the more astonishing, because many authors make success of transplantation dependent on preservation of viability of the transplant, which is imperative in the transplantation of whole organs. When transplanting an organ, the surgeon usually endeavours to shorten to a minimum the time between separation of the organ from the donor and implantation into the recipient. Conservation usually impairs the results of transplantation of organs; the more and the longer its duration the worse the chance of success. The permissible duration of conservation in transplantation of organs is usually counted in hours and only in rare cases may it reach several days.

In this respect it is quite different with conserved static tissues and those with a supporting or skeletal function, such as bone, tendon, cartilage, vessels etc. Filatov (1958) observed better results after transplantation of allogenic tissues, conserved at low temperatures for 2—8 months, Imamaliev (1962) believed that it was better to conserve bone and semijoints for six months. Lantz (1959) extended duration of the conservation of bone to one year. Conservation of cartilagious tissue (Silaeva, 1959), tendon and fascia (Degtyareva et Lavrishcheva, 1962; Krupko et Tkachenko, 1967 and Demichev, 1968) as well as vessels (Krakovsky et al., 1958 and Androsov, 1959) and nerves (Anokhin, 1943) has no negative influence on the results of transplantation. It thus has

become evident that it is not viability inevitably worsening through conservation, which determines the results of transplantation of static tissues, but some other of their properties. At the same time, the basic criterion of efficacy of one or the other method of tissue conservation is considered to be preservation of viability by most authors (Filatov et Medvedev, 1970). For this purpose nutritives, vitamins, antihistaminics and other substances are added to the conservation media, in order to maintain the metabolic processes in the cells. However, it has proved impossible to ensure regular metabolism in tissues by diffusion from the surrounding medium and, therefore, preservation of their viability for any length of time under such conditions cannot be accomplished.

The other principle, recommended for preservation of tissue viability during conservation is a maximum suppression of metabolic processes. For this purpose, the tissues are subjected to cooling down to very low temperatures or lyophilization (freezing together with subsequent dehydration in a vacuum). Tkachenko (1970) summing up his studies on the state of viability of bone tissue conserved by cooling without protecting it with special measures, wrote: "On the basis of microscopic studies of transplants and tissue cultures, by investigating tissue respiration and employing radioactive atoms, one may reach the conclusion that bone tissue conserved by freezing dies after a short time, no matter what method of conservation has been employed". As far as lyophilization is concerned, Lapchinsky et Lebedeva (1960), Kovalenko (1967) and Ruindezh et Sheina (1970) have shown that tissues lyophilized by their methods are not viable. After transplantation the frozen or lyophilized homotransplants of bone undergo the same transformation as do bones transplanted in fresh (viable) condition: Vessels invade them and they are absorbed and replaced by regenerating tissues of the recipient (Kovalenko, 1957; Yumashev, 1963 and Stetsula, 1968). When conserved in Plastmass for one month, pycnosis of most of osteocyte nuclei develops and after three months, all cell elements of bone have undergone necrosis (Rogozheva et al., 1970). However, when transplanting bone tissue which has been conserved in Plastmass for three years, evidently quite dead, it has not lost the capacity for being absorbed and replaced by tissues of the recipient (Askerov).

Using tissue cultures Ruindezh et Sheina (1970) convinced themselves that although not viable, lyophilized fascia was still capable of transformation one year after transplantation when it had become completely identical with the recipient tissue and could only be distiguished from it by denser vascularization.

Medvedev et al. (1970) conserved cartilage in fluid media of complex composition consisting of nutritives, antibiotics, vitamins, etc. as well as by cooling at -25^0, -76^0 and -196^0 and lyophilization. With all these methods of conservation, degenerative changes developed in the chondrocytes. However, this did not lessen the suitability of tissues thus conserved for reconstructive surgery.

Everything, therefore, is evidence of the fact that the result of transplanting static tissue is not achieved by maintaining them viable up to transplantation.

The percentage of complications in homoplasty of bone, particularly when massive grafts are used, is rather high and, according to certain reports, has reached up to 30—35 % (Skard et Monlyr, 1954; Krupko et al., 1969 and Makhson, 1970). One of the main causes of failure after transplantation of massive bone grafts, these authors consider to be an immunological conflict, developing from antigenic differences in the tissues between donor and recipient. The carrier of antigenic differences is, as is well known (Burwell et Gowland, 1963), abundance of cell material, chiefly of cells of the red bone marrow in these transplants. The way to overcoming the incompatibility reaction after transplantation of organs is the selection of the donor with a composition of antigens as near to that of the recipient. But as it is impossible to achieve complete identity of antigens in donor and recipient, for overcoming of the incompatibility reaction, it is imperative to suppress the immunological mechanisms of the recipient in all cases. Since immunosuppressives lower the general resistance of the organism to infection, they are only employed in transplantation of vital organs. Employment of such drugs for transplantation of bone, tendon, fascia, etc., so-called homostatic tissues (Pate, 1954) as well as skin is not sufficiently justified and they are, therefore, not used for the purpose.

Better results of transplantation of conserved than fresh tissues have led some authors to the opinion that conservation by any method has an influence on the antigenic properties of tissue. It was discovered (Burwell, 1963 and Zhukovsky et Meyerson, 1966) that after the transplantation of bone tissue conserved by cooling, the immunological reaction appeared weaker than after the transplantation of fresh bone. The same was confirmed by Timashkevich (1967) in bone conserved in hypertonic sodium chloride solutions and by Rozvadovsky (1967) in bone conserved in a weak solution of formalin. However, investigation of antigenic properties of native tissues as compared to tissues conserved by cooling (Meyerson, 1961 and Artsimovich, 1967) or lyophilization (Bilenko et Kapichnikov, 1959), did not disclose any difference. Nor did the study of antigenic properties of tissues conserved in formalin lead to disclosure of differences between them and native tissues (Kosyakov, 1937; Kuznetsova, 1956 and Feygelman et al., 1971). Thus changes in the antigenic specificity during conservation cannot be regarded the cause of the weaker immunological reaction to transplantation of conserved as compared to fresh tissue.

Neither did the conception of conservation "transforming" the tissue into a condition of anabiosis lead to clarifying the problem, because anabiosis does not change the antigenic properties of tissues (Smit, 1963). Apart from that it is evident that as soon as the tissue has emerged from the condition of anabiosis and restored viability of its cells, the antigens foreign to the recipient must provoke incompatibility reaction.

Another view is based on the fact that a weaker reaction of incompatibility after transplantation of conserved homotransplants is probably connected with an impediment to releasing antigens as a result of the rather late vascularization of the transplant (Meyerson, 1963 and Klen, 1962) or as a result of block-

ing or washing-out of the antigens during preparation of the graft for conservation (Burwell et Gowland, 1963 and Timashkevich, 1967).

In his investigations, the author proceeded from the well-known theory of the incompatibility reaction developing as a result of immunization of the recipient by the antigens passing into the organism from the transplant. At present, such antigens have been isolated. They proved to be substances of protein nature (Haskova, 1964;, Medawar, 1964; Amill, 1967; Kahan et Reisfeld, 1969 and Vladimirsky, 1970).

To obtain transplantation antigens is extraordinarily difficult because of their firm links with other protein components of cells, which requires proteolytic enzymes for breaking them up (Kahan, 1968 and Davis, 1968). Inside the organism, the transplantation antigens are produced in less quantity (Hardin et Aetal, 1957 and Ungar, 1957) under the influence of the autolytic enzymes of damaged and dying cells of the transplant. A rise in the concentration of proteolytic enzymes in the blood serum of the recipient activates the immunological reaction; if the recipient receives inhibitors of protease, the survival time of a homologous skin graft can be lengthened (Gilette et al., 1960; Bogdanov et al., 1964 and Eisele et al., 1966). This induced the author to suggest inactivating proteolytic enzymes in the tissues to be transplanted in order to weaken the incompatibility reaction. The papers of Rozvadovsky (1967), Eyngorn et al. (1968) on the absence of morphological symptoms of incompatibility reaction after transplantation of homologous bone which had been conserved in an 0.5 % solution of formalin for 3—6 months, became the basis for the author's study of the activity of proteolytic enzymes in tissues treated with formalin. The results of the investigation showed that when bone is stored in 0.5 % formalin, activity of proteolytic enzymes is rapidly lowered and after 15 days they become completely inactive. On the whole, it seems probable that inactivity of enzymes in tissues conserved in formalin is the cause of a more difficult freeing of antigens from transplant and thanks to this, incompatibility reaction becomes weaker.

Since the dissolution of transplant antigens is evidently of great significance to the development of incompatibility reaction, it was interesting to elucidate how the total amount of water-soluble proteins of tissues changed during conservation and also to investigated whether or not a relationship existed between this and the intensity of the incompatibility reaction.

The author determined the content of water-soluble proteins in the water-salt extract of a homogenate of metaphyseal ends of femur and tibia in rabbit as well as tendo Achillis conserved in 0.5 % formalin. The tissue to be investigated was cut by scissors into small pieces and ground in a porcellane mortar with sand. A weighed double amount of saline was added to the homogenate and mixed in the refrigirator at 4^0 for 24 hours. Afterwards is was centrifuged at 6000 rev./min. for 10 minutes and the total amount of proteins determined in the supernatant by the micromethod of Kjeldahl. It could be shown that in skin (Feygelman et Torbenko, 1970), bone and tendon conserved in formalin considerable diminution of the content of water-soluble proteins

had been effected. After seven days, the amount of water-soluble proteins in bone had decreased to one-third (from 21.2 ± 3.0 to 6.2—1.2 mg./ml.), but after one month they preserve 10 % of the original amount. In tendon the amount of water-soluble proteins decreased after 24 hours storage in 0.5 % formalin to one-tenth (from 4.1 ± 0.2 to 0.4 ± 0.1 mg./ml.). After ten days only about 3 % (0.14 ± 0.1 mg./ml.) of the water-soluble proteins remained in the tendons. The cause of diminution of the amount of water-soluble proteins in tissues conserved in formalin, is the capacity of formalin to bind protein into large insoluble protein complexes (Woker, 1957 and Feygelman, 1962).

When investigating the immunological reaction to the transplantation of a homologous skin graft stored in formalin is became evident that all regional lymph nodes were half the size and their cytological reaction had considerably weakened, as compared to the condition after transplantation of fresh homologous skin. Confirmation of the fact that during conservation of tissues in formalin, the transplant antigens are fixed together with the water-soluble proteins, is the absence of a reaction to a second-set transplantation of homologous skin to rabbits and Guinea pigs after treating it with formalin (Feygelman et Goncharenko, 1970).

The relationship between diminution of the amount of water-soluble proteins in tissues and weakening of the incompatibility reaction also becomes evident from the paper of Timashkevich (1967) who showed that when transplanting bone conserved in hypertonic solutions of sodium chloride, the incompatibility reaction was also weaker than after transplantation of fresh bone. When investigating the water-soluble proteins in bone conserved in a hypertonic solution of sodium chloride, the author of this communication found that after one month, their amount had dropped to 25 % of the original.

Conservation of bone at —25^0 is not accompanied by any noticeable diminution of the content of water-soluble proteins (Balab et al., 1966). With prolonged storage at low temperatures, the content of water-soluble proteins dropped and after one year it had reached a total of about 10 % of the original, according to Musienko et Kozlova (1967). These authors showed that such bone grafts had become more suitable for plastic surgery and their transplantation was accompanied by less complications than when using fresh tissue or tissue conserved and stored for a shorter period.

As can be seen, a certain relationship exists between diminution of the total amount of water-soluble proteins in tissues during conservation and the intensity of the incompatibility reaction to their transplantation; the smaller the amount of these proteins, the weaker the reaction. Chalmers (1963) and Okuneva observed a reversed relationship between the intensity of incompatibility reaction and the duration of conservation, and though it is possible to explain it by biochemical changes taking place in the tissues during storage. One of it could be diminution of the amount of water-soluble proteins. Since the transplantation antigens are chiefly cytoplasmic proteins, changes of any extent in the total amount of water-soluble proteins in tissues during storage

permit an indirect conclusion concerning the conditions of transplantation antigens.

However, success of transplantation of static tissues is not only dependent on the influence of the immunological reaction. Boiled bone which does not evoke any incompatibility reaction, is only partly or not at all transformed and, instead, encapsulated (Lavrishcheva, 1970). Greatly prolonged storage at low temperatures also impairs the results of bone plasty (Welmitz, 1969 and Imamaliev, 1970). The studies of Young (1964) and Wilfried de Neve (1969) showed that very long storage at low temperatures effected changes in structure of the ground substance of bone. It is possible that coagulation of proteins during boiling as well as their decomposition during protracted conservation hamper invasion of the transplant by the recipient vessels. It, therefore, becomes evident that, for the purpose, it is most favourable to preserve the structure of the ground substance of bone in a condition as similar as possible to the native one. As was shown by Nasonov et Alexandrov (1944) and Golovinova (1948), formalin, in contrast to other fixatives, preserves many qualities of native protein. It may be that preservation of the microstructure in the ground substance of the transplant in a condition similar to that of native tissue, is one of the main causes for the success achieved by Rozvadovsky (1970), Zorakhovich (1970) and Epifanov (1970) with homotransplantation of bone treated with formalin.

It may be assumed that the results of transplantation of static tissues, disregarding the character of the surgical technique used, are determined, in the extreme case, by two factors: intensity of incompatibility reaction and the speed with which vessels invade the transplant. For the former, the cell elements of the transplant, for the other, the condition of its intercellular ground substance, represented by collagen, take responsibility.

The biological peculiarity of static tissue transplants of their cells usually to die after transplantation, while the transplant is absorbed and replaced by regenerating tissue of the recipient, gives other possibilities to overcoming the incompatibility reaction than does transplantation of whole organs. Since the success of static tissue transplantation does not depend on preservation of viability of cells, weakening of the incompatibility reaction may, in these instances, be effected by preliminary preparation of the transplant, aimed at inactivating its autolytic enzymes and denaturating its cytoplasmic proteins. However, with this another problem arises, that of preservation of the ground substance of transplanted tissue in a condition as similar as possible to the native. The method of conservation, satisfying these two requirements, may not only serve conservation of static tissues, but could also become a means for improving transplantation properties. The knowledge of two biochemical signs of transplanted tissue is extremely important from a practical point of view: the changes during conservation in the total amount of water-soluble proteins, which should permit predicting the intensity of the immunological response to transplantation and the content of residual nitrogen, which, to some extent, should permit a conclusion as to the condition of the transplant's micro-

structure. The total amount of water-soluble proteins and the residual nitrogen of tissue should, in the author's opinion, be determined prior to conservation. Before handing it out to the department, these parameters should be determined again. If the amount of water-soluble proteins has grown smaller during conservation and the residual nitrogen did not increase, indirectly indicates that transplantation antigens would also enter the recipient organism in smaller quantities, and that the structure of the ground substance has not been disrupted to any extent. In this case, one may assume that the reaction of the recipient to such a transplant will not be intensive and the graft will undergo transformation. Considerable increase in residual nitrogen in the conserved tissue indicates disintegration of tissue and, disregarding diminution of the amount of water-soluble proteins, it is, therefore, unsuitable for transplantation.

CONCLUSIONS

1) The problem of conservation of static tissues differs from that of conservation of whole organs in that viability needs not be preserved in the former.

2) This makes it possible to weaken the incompatibility reaction, when static tissues are transplanted and prior to is treated with the aim at inactivating the autolytic enzymes and denaturating the cell proteins of the transplant.

3) When conserving static tissues, the ground substance (collagen) must be preserved in a condition which is most similar to that of native tissue.

4) Conservation of static tissue may thus not only become the means of preservation, but also of improving the suitability of the graft for transplantation.

B. K.

SUMMARY

The biological peculiarities of accepting homologous static tissues by the recipient which lie in the fact that the cells of such transplants usually die after transplantation and the grafts are absorbed and replaced by regenerating tissues of the recipient, present the possibility of employing tissues in nonviable condition for transplantation. The absence of the need to preserve their viability up to transplantation permits to act upon static tissues with the aim at weakening incompatibility reaction by hampering the transfer of transplantation antigens from the grafts into the recipient. This can be achieved by inactivating their proteolytic enzymes and transforming the water-soluble proteins into water-insoluble ones. Experimental results, confirming this assumption, are referred to. However, it is important for the transformation of static tissue grafts to preserve their intercellular ground substance in a condition which remains as similar as possible to that of native tissue. Thus conservation of static tissues may not only become the means of preservation, but also the method of improving their suitability for transplantation. The possible biochemical changes in tissues during conservation and the way this permits to predict their influence upon the intensity of incompatibility reaction and the duration of transplant transformation, are discussed.

RÉSUMÉ

Quelques questions traitant la conservation des tissus statiques

Feygelman S. S.

Les particularités biologiques de l'adhésion des tissus homoplastiques consistent en fait que les cellules de ces greffes s'atrophient régulièrement bientôt après la transplantation et la greffe elle même est résorbée et remplacée par les tissus régénérant de l'hôte. A cause de cela, il y a une possibilité d'utiliser pour la transplantation les tissus qui ne sont pas viables. L'impossibilité de conserver les tissus statiques en état viable jusqu'à la tranplantation permet d'agir sur la greffe de manière que la sécrétion des antigènes de transplantation de celle-ci soit ralentie dans le but d'abaisser la réaction de l'incompatibilité. Ça peut être réalisé par l'inactivisation de ses ferments proteolytiques et par la transformation des albumines solubles dans l'eau de la greffe aux albumines insolubles. Les résultats expérimentaux présentés certifient cette hypothèse. Mais pour la transformation des greffes statiques, il est important de conserver la matière basale intercellulaire en tel état qui soit le plus similaire à celui du tissu natif. Ainsi, la conservation des tissus statiques peut devenir non seulement la méthode de leur dépôt, mais aussi la manière d'améliorer leur aptitude à la transplantation. On discute la possibilité d'évaluer l'intensité de la réaction de l'incompatibilité et la durée de la transformation de la greffe de certaines modifications biochimiques dans la greffe qui se produisent pendant la conservation.

ZUSAMMENFASSUNG

Einige Fragen der Konservierung der statischen Gewebe

Fejgelman S. S.

Die biologischen Besonderheiten der Anheilung der homoplastischen Gewebe, die darauf begründet sind, dass die Zellen dieser Transplantate regelmässig bald nach der Transplantation absterben und dass das Transplantat selbst resorbiert und durch regenerierende Gewebe des Empfängers ersetzt wird, geben die Möglichkeit, zur Transplantation Gewebe anzuwenden, die nicht lebensfähig sind. Die Unmöglichkeit die statischen Gewebe in lebensfähigem Zustand bis zur Transplantation aufrechtzuerhalten gestattet es, auf das Transplantat so einzuwirken, dass die Ausscheidung der Transplantationsantigene verzögert wird mit dem Ziel die Unverträglichkeitsreaktion zu vermindern. Dies kann durch die Inaktivierung seiner proteolytischen Fermente und Verwandlung der wasserlöslichen Eiweissstoffe des Transplants in wasserunlösliche erreicht werden. Die vorliegenden Versuchsergebnisse bestätigen diese Hypothese. Für die Transformation der statischen Transplantate ist es jedoch von Wichtigkeit, die Grundzwischenzellenmasse in einem Stand zu erhalten, der dem Stand des nativen Gewebes am nächstliegenden wäre. Auf diese Weise kann die Konservierung der statischen Gewebe nicht nur zu einer Methode ihrer Aufbewahrung, sondern auch zu einem Verfahren zur Verbesserung ihrer Transplantationsfähigkeit werden. In der Diskussion wird die Möglichkeit der Beurteilung der Intensität der Unverträglichkeitsreaktion und der Transformationsdauer des Transplantats auf Grund einiger biochemischer, im Transplantat während der Konservierung entstehender Veränderungen behandelt.

RESUMEN

Algunas cuestiones sobre la conservación de los tejidos estáticos

Feygelman S. S.

Las particularidades biológicas en la adhesión de los tejidos homoplásticos que consisten en el hecho que las células de tales injertos normalmente se atrofían poco tiempo después de la transplantación y el injerto mismo es resorbido y sustituido por los tejidos regenerantes del huésped, presentan la posibilidad de emplear para la transplantación también los tejidos que no sean viables. La imposibilidad de conservar los tejidos estáticos en el estado viable hasta el tiempo de la transplantación permite accionar sobre el injerto de tal manera para que sea retardadad la eliminación de los antígenos del injerto con el fin de aminorar la reacción de la intolerancia. Es posible realizar esto en el caso si los fermentos proteolíticos del mismo se inactivan y si las albúminas del injerto solubles in agua se cambian en las albúminas no solubles in agua. Los resultados experimentales presentados confirman esta hipótesis. Para realizar una transformación de los transplantes estáticos es, sin embargo, importante conservar la sustancia intercelular en tal estado que sea más próximo al estado del tejido nativo. Así la conservación de los tejidos estáticos puede servir no solamente de método de almacenación de los mismos, sino también del modo de mejorar su aptitud para la transplantación. En la discusión se habla sobre la posibilidad de evaluar la intensidad de la reacción de intolerancia y la duración de la transformación del injerto a base de algunos cambios bioquímicos en el injerto que se producen durante la conservación.

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S. S. Feygelman, CITO, ul. Priorova 10, Moscow 125 299, USSR

Departement of Transplantology, Warsaw (Poland)

THE ACTIVITY AND RESEARCH PROGRAMME OF THE TISSUE BANK IN WARSAW

J. KOMENDER

The Central Tissue Bank at Warsaw was created in 1965, as a part of the Department of Histology. Since 1970 it is working as a separated Department of Transplantology. This is not a big team, there are four scientists and four technicians engaged to work in it. Since 1965 this team has prepared over 14000 transplants for 175 hospitals in all the Poland. These transplants are: human bone-compact and spongious, bovine bone — after deproteinization, tendons, fascia, dura mater and cartilage. Beside the tissue transplants we are preparing also the pulverised cartilage and extract from bovine cartilage for use in dermatology and stomatology.

The research work is concentrated on the following problems:

1. The phenomenon of "electron spin resonance" in irradiated bone.
2. The properties of preserved bone.
3. The induction of heterotopic osteogenesis.
4. Investigation on the perforated bone transplants.
5. The studies on the collagen membrans.
6. Investigation on the infiltration evoked by allogenic graft.

The properties of preserved tissues were described in some papers before [3, 4, 5]. In the last time [3] the mechanical properties of preserved bone is a subject of many investigation. This is well known that all preservation procedures may change mechanical properties of prepared transplants. We performed some systematical studies on this topic using for bone testing, the tests used in metallurgy (bending, compresion and torsion). We found that: the human bone, deep freezed only do not show noticeable changes in the mechanical properties. Lyophilization and gamma irradiation however, changed significantly the mechanical characteristics of bone. Direction of these changes is unprofitable for clinical use, but some of them are reduced by rehydratation of bone sample. This disadvantage of lyophilized and irradiated grafts does not change fact that these kind of grafts is very much useful. In 1972 during

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the XIX Congress of the Orthopedic and Traumatologic Society in Warsaw a special conference concerning "The use of homostatic grafts" was organized. There were presented the therapeutic effects of transplants and it was confirmed again how valuable and useful this material is.

From some experiments on dogs (6) we know, that when perforated bone graft is used, the substituting of it by host tissues is much quicker than this of the solid bone fragment. It seems also that the induction of osteogenesis is more evident in the case of perforated bone graft. But it is also truth that the perforations diminished mechanical resistance of bone. We have been looking for the new methods for bone perforating. Now we try to adapt the laser beam for making such perforation. The diameter of single laser made perforation is 200 μm and it is four times smaller than this which is made mechanically. We expect that this small perforations may be less critical for mechanical resistance of the grafts. Histological examination of such perforation does not show significant damage of the tissue.

In many clinical centers the collagen membranes for many purposes are used in surgerry. So we took some action to prepare the collagen membranes too. Using the collagen from bovine tendons we prepared the definite products in the form of single, double or three-layers membranes. Now they are in experimental control. We already know, that their antigeneity is very low.

There were also some succesful effort undertook to estimate quantitatively the cellular population in infiltration of skin allograft in mice (1). The cells found in such infiltration are: reticular cells, basophilic cells, lymphocytes, neutrophils, "macrophage like cells" and the mast cells. The most specific for such infiltration are basophilic cells appeared in infiltration on 4 day of experiment and they increased in number until 8 day. The modification of number of the other cells were observed too. Using the albumin gradient we isolated the basophilic cells population, for further experiment.

This is a short report concerning the activity of tissue preservation center from Warsaw.

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Dr. J. Komender, Chałubińskiego 5, Warsaw, Poland

Grace General Hospital, Winnipeg, Manitoba (Canada)

REPLANTATION OF COMPOSITE GRAFT OF THE NASAL ALA

Case Report

N. I. ELSAHY

Reports on successful replantation of the nasal ala after its complete amputation by dog bite are very few. Most surgeons allow spontaneous healing of the defect and later application of a composite graft from the auricle. In the case to be described here, replantation of the amputated part was performed with complete success.

Fig. 1 — The nasal defect after dog bite

CASE REPORT

A 14 year old male caucasian was bitten on the nose by a neighbours Dachshund dog. This resulted in loss of the left ala (skin, cartilage, vestibule and mucosa), leaving ragged edges (Figure 1). Upon my suggesion the boy's

Fig. 2 — The composite graft (skin, cartilage, vestibule & mucous membrane) replanted. — Fig. 3 — Eight days post-operative

parents searched for the missing part and two hours later returned having found it in their garden.

The ala was immersed in saline and placed in refrigeration at about 7 degrees centrigrade until the time of the operation which was performed some two hours later.

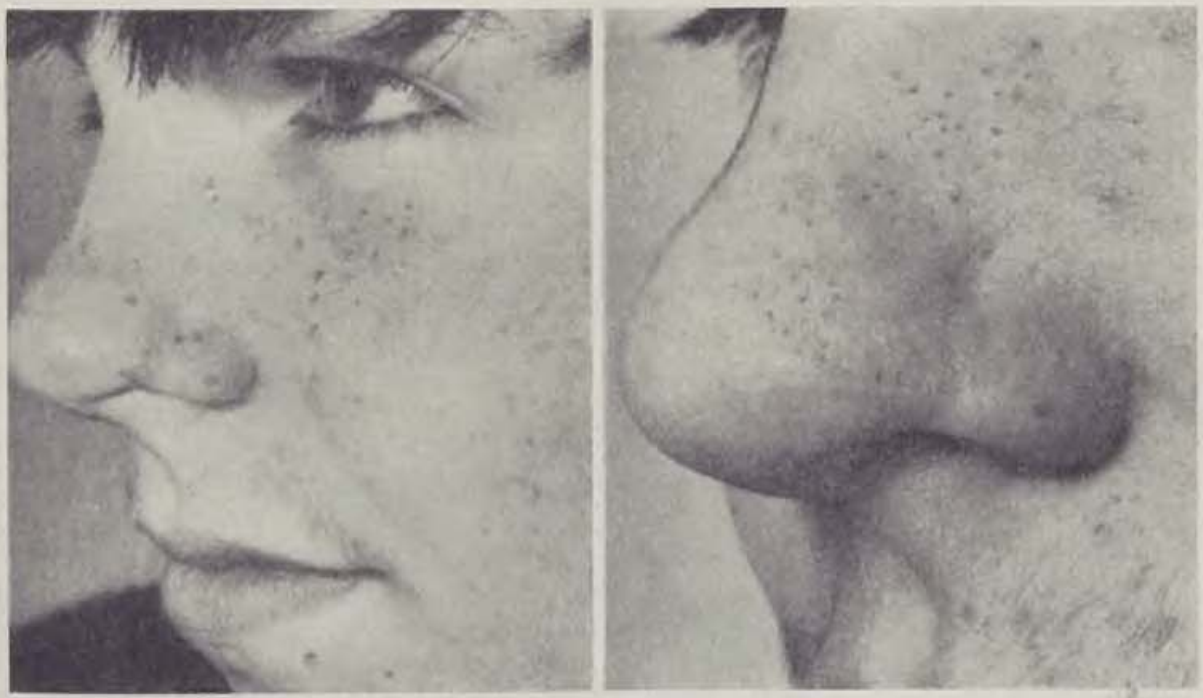

Fig. 4 — Four months post-operative. — Fig. 5 — Eight months post-operative

OPERATION

The amputated ala was mechanically cleansed in saline solution. No debridement was performed. Under local anaesthesia the injured nose was thoroughly cleansed with phisohex then saline solution.

Intranasal, then extranasal suturing of the ala was done using 5—0 catgut and 5—0 polyethylene sutures respectively (Fig. 2). No dressing was applied.

The composite graft appeared to be vascularized except at the centre which appeared to be dead white in the first three days then cyanotic on the fourth day. The sutures were removed on the eight day (Fig. 3). The vascularity of the centre of the ala continued to improve in the next few months but was marked by an area of hyperpigmentation (Fig. 4). Seven months later the graft acquired normal colour and was hardly recognized from the rest of the nose (Fig. 5).

DISCUSSION

Grabb and Dingman (3) reviewed the previous reports and found that there have been 19 reported survivals of completely amputated tissue of the head and neck within the last 470 years. Most of these amputated parts were replaced within two hours of the accident.

The present case was replaced four hours after the accident. In my opinion cleansing without debridement is important for exact opposition of the graft and recipient area. This may facilitate the inosculation mechanism of the blood vessels that has been suggested by many authors (2, 3, 4) and may be responsible for the survival of the graft. Moreover, debridement will cause great shrinkage in the size of the graft. A graft of 10 mm sq. and volume of 1000 mm will lose about 27 % of its volume if debridement of only 1 mm is performed on each surface, and will lose 49 % of its volume if debridement of 2 mm is performed.

SUMMARY

A case of complete success of a replanted nasal ala after its entire amputation by dog bite is presented. The importance of mechanical cleansing rather than debridement is stressed.

RÉSUMÉ

Réplantation de l'aile du nez par une greffe compliquée

Elsahy N. I.

On décrit un cas de réplantation de l'aile du nez couronnée de succès. Celle-ci a été arrachée par un chien. On souligne le nettoyage méchanique et le rincement qui sont plus importants que l'écartement du tissu écrasé.

ZUSAMMENFASSUNG

Replantation des Nasenflügels mit einem komplizierten Transplantat

Elsahy N. I.

Der Autor beschreibt eine vollig erfolgreiche Replantation des Nasenflügels in einem Fall, wo dieser von einem Hund restlos abgebissen wurde. Es wird hervorgehoben, dass die mechanische Reinigung und Durchspülung wichtiger ist, als die Entfernung des zerquetschten Gewebes.

RESUMEN

Replantación de la ala de la nariz con injerto complicado

Elsahy N. I.

Fue descrito un caso de una replantación exitosa de la ala de la nariz que fue mordida completamente por un perro. Se subraya que una limpiada mecánica y lavada son más importantes que la remoción del tejido aplastado.

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N. I. Elsahy, M.D., F.R.C.S., 2589 Assiniboine Crescent, Winnipeg R3J 0B6, Manitoba, Canada

Birth Defects in the World

were discussed by the Fourth International Conference, held at the Vienna Congress Centre "HOFBURG" on the days of Sept. 2nd.-8th. 1973, with 821 delegates from 43 countries participating. The Conference has been one of a number of already traditional meetings held every fourth year by the Roosevelt Foundation "March of Dimes", which are in fact substituting the so-far non-existent official world forum of teratologists. The well organized event, bore the characteristic features of large congresses. The themes being most exhaustive, eight parallel sections were required to hold their discussions. A number of authentic reports will probably influence the development of the branch in a decisive way. In the field of developmental biology, the results of a detailed analysis of the structure of chromosomes and the mechanism of transcription (Britten Pardue) should be mentioned in the first place. They represent a theoretical basis for future substitution of genetic information on defects, especially in the case of congenital metabolic diseases. In the therapy of disorders of hemoglobin synthesis, a realistic perspective is afforded by the possibility of gene synthesis in vitro by means of reverse transcriptase and their incorporation into the system of animal cells by means of viruses (Marks). Successful control of ovulation, the accomplished technique of collecting human oocytes (successful in 73 %), the perception of the limits of their regulatory abilities and conditions of storing, are one of the possibilities of diagnosing early developmental defects as well as establishing the basis for possible positive intervention in the further development (Edwards). In the branch of experimental teratology, the methods of preparing allophenic organisms (Mintz) afford a far more effective way of studying means of realizing the genetic programme of morphogenesis at the level of the cell populations. Some new methods of prenatal diagnosis were discussed in the clinical part. With embryoscopy remaining a very risky method inapplicable on a broad scale, significant advances have been made in the method of diagnosis by ultrasound. A number of developmental defects (hydrocephaly, anencephaly, agenesis of kidney etc.) can now be diagnosed by this method without risk and in addition there is the possibility of a number of further technical improvements (Campbell). No significant discoveries have been made in the questions concerning the testing of the teratogenity of drugs. The general scepsis has been strengthened by the finding that non-human primates can not be used for teratologic routine screening; this is so in consideration of the high costs and the limited number available and also due to the fact that the results can neither prove nor disprove embryototic potential for man (Wilson).

The fact that outstanding personalities step into the background or cease to exist, appears in teratology just as in other scientific disciplines, but rather alarming is the geographical distribution of centres and individuals, systematically concerned with the research of birth defects. Of the participants at the Congress, 93.2 % came from capitalist countries, 3.6 % from socialist countries and 3.2 % from countries of the so called Third World. Even if we refrain from the distortions caused by the nature of the nature of the organization which arranged the Congress and by the place where it was held, we must arrive at the conclusion, that this striking disproportion refutes, in principle, the possibilities, the nature and also the proclamations on the care for the population in both extreme types of social-economic formations.

R. Jelínek

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