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CLEFT LIP AND PALATE: VARIABILITY IN THE CZECH POPULATION, SEX RATIO AND FAMILIAL INCIDENCE

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INTRODUCTION

Cleft lip and palate pose one of the main problems for plastic surgery. Cleft-affected children require specialized comprehensive surgeon-conducted care until adulthood (4, 5). Czechoslovak therapeutical and preventive conception envisages not only consistent prevention of the consequences of clefts for individual patients but also preventive measures within the family (familial preventive regimen) and the population. Any rational measures in this particular field of care must rest primarily on a sound knowledge of the aetiology of the defect using the methods of genetics, epidemiology and experimental teratology.

Cleft lip (CL), cleft lip and palate (CLP) and isolated cleft palate (CP) are very frequent anomalies among the Czech population (2 per 1,000 newborn) representing a major health problem. Out of all the cleft-affected children, over 10 % are stillborn or die early in life. This accounts for the fact that clefts are in the focus of research interest all over the world. Experimental models already make it possible to study precisely their aetiology and pathogenesis (9). Yet the aetiology of clefts in humans still remains a moot point. The uses of clinical material have, to a certain degree, been lagging behind experimental teratology so that by now only one "general" aetiological factor has been demonstrated, i. e., genetic disposition deduced from familial incidence and from research into twins. While there are a number of major contradictions a certain unity of opinion seems to arise from the recognition that clefts represent an obviously heterogenous syndrome (1, 3, 6, 7, 8, 9, 10) and that most are likely to be cases of polyfactorial determination. For over 40 years now, we have been using the Fogh-Andersen classification of clefts into genetic groups I (CL+CLP) and II (CP).

Different genetic and exogenous influences may obviously, to a different degree and quality, trigger off the defect when their aggregate effect has exceeded the threshold of teratogenesis in a sensitive phase of embryogenesis.

We do not expect the discovery of but a few factors to account for the aetiology of clefts in man. Rather, there will be a mosaic of dispositional as well as toxic effects acting as a whole and probably each time in but some of the cases concerned. A study of that kind requires a huge quantity of material from the defined population and area. As these conditions are met by patients treated at the Department of Plastic Surgery in Prague, we decided to study

Table 1. Basic cleft types share in the Czech population. M = male, F = female. Note: the order ratio of M and F can be read from the columns in the bottom part of the table. (Series from Bohemia, 1964—1983, n = 2,879)

| Type | n | % | Type | % | Sex ratio | Type | % | Type | % |
|----------|------|----|------|-----|-----------|-------------------------------------|--------------------|--|----------------|
| CLP + CL | 1867 | 65 | CL | 37 | 0.605 | subtot. totalis | 72 28 | left-sided right-sided bilateral | 64 27 9 |
| | | | CLP | 63 | 0.683 | subtot. totalis | 21 79 | left-sided right-sided bilateral | 46 26 29 |
| CP | 1012 | 35 | CP | 100 | 0.416 | durum molle submuc. varium | 60 29 8 3 | | |

Order representation of cleft types

| Sex | CL : CLP : CP | CL : CLP | CL : CP | CLP : CP | CLP + CL : CP | Σ |
|-------|---------------|----------|---------|----------|---------------|----|
| M | 3 : 6 : 3 | 3 : 6 | 3 : 3 | 6 : 3 | 9 : 3 | 12 |
| F | 2 : 3 : 4 | 2 : 3 | 2 : 4 | 3 : 4 | 5 : 4 | 9 |
| M + F | 5 : 9 : 7 | 5 : 9 | 5 : 7 | 9 : 7 | 14 : 7 | |

the material. At the same time, this introductory study presents a characteristic of the Czech population by the relative proportion of cleft subtypes and their combinations for the 1964—1983 period. This may provide the groundwork for observations of population development at altered civilization factors. Because of antenatal selection (spontaneous abortions, sterility) the actual number of clefts need not increase even at increased ecological load but there may be changes in their spectrum, sex ratio, familial incidence etc., i. e., factors which we partly summed up in the form of "reciprocal balance" [2]. For that reason, too, we regard as important to document the situation of the past twenty years.

Table 2. CL and CLP representation by the type of CL, sex ratio and probability of CLP developing from CL ($p = CL + CLP/CLP$). T and S = total and subtotal cleft lip Bilat T+T = bilateral total CL. () = small numbers. Series from Bohemia, 1964-1983, $n = 1,867$

| Cheiloschisis | | CL | | | CLP | | | CL+CLP | | | Probability of CLP | | |
|----------------|---------------|-----------|-------|--------------|-----------|-------|--------------|-----------|-------|--------------|--------------------|-------|-------|
| | | n abs. | % | sex ratio | n abs. | % | sex ratio | n abs. | % | sex ratio | M | F | M+F |
| Cicatrix | left | 10 | 1.5 | (0.400) | 0 | 0 | (0.000) | 10 | 0.5 | (0.400) | 0.000 | 0.000 | 0.000 |
| | right | 6 | 0.9 | (0.666) | 1 | 0.1 | (1.000) | 7 | 0.4 | (0.714) | 0.200 | 0.000 | 0.143 |
| Subtotal | left | 311 | 45.3 | (0.665) | 135 | 11.4 | 0.689 | 466 | 23.9 | 0.673 | 0.310 | 0.288 | 0.303 |
| | right | 119 | 17.4 | 0.663 | 76 | 6.4 | 0.724 | 195 | 10.5 | 0.687 | 0.411 | 0.344 | 0.390 |
| | bilat. | 37 | 5.4 | 0.514 | 40 | 3.4 | 0.575 | 77 | 4.1 | 0.546 | 0.548 | 0.486 | 0.520 |
| Total | left | 108 | 15.7 | 0.527 | 407 | 34.5 | 0.651 | 515 | 27.6 | 0.625 | 0.823 | 0.736 | 0.790 |
| | right | 57 | 8.3 | 0.473 | 224 | 19.0 | 0.728 | 281 | 15.1 | 0.676 | 0.858 | 0.670 | 0.797 |
| | T+S | 15 | 2.2 | (0.667) | 77 | 6.5 | 0.714 | 92 | 4.9 | 0.706 | 0.846 | 0.815 | 0.837 |
| | Bilat. T+T | 11 | 1.6 | (0.272) | 220 | 18.6 | 0.691 | 231 | 12.4 | 0.671 | 0.981 | 0.895 | 0.952 |
| Varium (atyp.) | | 12 | 1.8 | (0.417) | 1 | 0.1 | (0.000) | 13 | 0.7 | (0.385) | — | — | — |
| Σ | | 686 | 100.1 | 0.605 | 1181 | 100.0 | 0.683 | 1867 | 100.1 | 0.655 | 0.660 | 0.580 | 0.633 |

MATERIAL AND METHODS

The starting material are data on 3,399 children with clefts (probands) born in the course of 20 years (1964—1983) and treated at the Department of Plastic Surgery in Prague. The Department provides care for the catchment area of Bohemia (westernmost part of Czechoslovakia, 6 million inhabitants, genetically Central European population, homogenous, high rate of clefts — 1 per 520 neonates). There is a high rate of probability of detecting cleft-affected children at the Department, about 90 %, which is in keeping with what is known as truncate selection. To have the series as homogenous as possible, we excluded children born outside the catchment area (70 pro-

Table 3. Combinations of different types of CL and CP in total clefts (CLP). The "non durum" group is a sum of cases of soft-palate, submucous and uvular clefts. (Series from Bohemia, 1964—1983, n = 1180)

| | CLP | CL | | | | Σ | % | |
|----|-------------|------------|--------|---------|--------|----------|------|-------|
| | | subtotalis | | totalis | | | | |
| | | unilat. | bilat. | unilat. | bilat. | | | |
| CP | durum | 151 | 30 | 608 | 291 | 1080 | 91.5 | |
| | molle | 13 | — | 2 | 4 | 19 | 1.6 | |
| | submucosum | 29 | 7 | 17 | 2 | 55 | 4.7 | |
| | uvula | 19 | 3 | 4 | — | 26 | 2.2 | |
| | “non-durum” | Σ | 61 | 10 | 23 | 6 | 100 | 8.5 |
| | | % | 28.8 | 25.0 | 3.7 | 2.0 | 8.5 | |
| | Σ | | 212 | 40 | 631 | 297 | 1180 | 100.0 |

bands, i. e. 2.1 %) and all foreigners. Also excluded were cases of well-defined syndromes and probands with another major associated congenital anomaly (450 probands, i. e. 13.4 %). Data on that particular group are dealt with separately. Included were Pierre Robin's syndrome, Sedláčková's syndrome (soft-palate afuction and shortening), atypical clefts, and multi-generation load cases suggesting the monofactorial type of inheritance. Consequently, the basic group consists of 2,879 probands. In some cases we decided not to include in the evaluation some of the very small subgroups (Sedláčková's syndrome, atypical clefts), or those cases where adequate information on the problem under scrutiny was not available. For that reason, the tables given the total number of cases.

Compared with the incidence of clefts in the population of neonates the detection rate at the Department is about 10—13 % lower (5) as the group does not include children who died before they could be referred to our Department (often with another congenital defect,) a small proportion of the children were operated on at other clinics (about 1—2 %), and as to the last two years (1982, 1983) we obviously do not yet know of all the cases of CP as these sometimes present rather late, in the 5th and 6th years of life, with submucous cleft palate cases reporting even later for lack of

Table 4. Familial load in % at coefficient of kinship (ck) 1/2 and 1/4—1/16 by the type of cleft, laterality and sex. (Subtotalis = subtotal cleft lip, sin. + dx. + bilat. = left-sided + right-sided + bilateral, totalis = total cleft lip sin. + dx. + bilat. = left-sided + right-sided + bilateral, M = male, F = female). Series from Bohemia, 1964—1983, n = 2,757

| Type | Sex | n | ck 1/2 in % | | | | | |
|--------|-----|------|-------------|-----------|---------|------|------|------------|
| | | | total | subtotal. | totalis | sin. | dx. | bilateral. |
| CL | M | 405 | 3.5 | 3.5 | 3.3 | 3.7 | 3.6 | 0.0 |
| | F | 269 | 4.8 | 4.7 | 5.1 | 4.9 | 5.6 | 2.9 |
| CLP | M | 807 | 7.1 | 7.0 | 7.1 | 5.9 | 5.5 | 10.4 |
| | F | 373 | 10.7 | 10.0 | 10.9 | 7.6 | 11.0 | 15.9 |
| CL+CLP | M | 1212 | 5.9 | 4.7 | 6.6 | 5.0 | 4.9 | 9.3 |
| | F | 642 | 8.3 | 6.4 | 9.5 | 6.4 | 8.4 | 12.7 |

| ck 1/4—1/16 in % | | | | | | | | |
|------------------|---|------|------|------|------|------|------|------|
| CL | M | 405 | 13.8 | 13.7 | 14.1 | 14.2 | 11.8 | 18.5 |
| | F | 269 | 13.4 | 12.9 | 14.3 | 17.9 | 6.9 | 5.7 |
| CLP | M | 807 | 12.0 | 12.2 | 12.0 | 13.4 | 11.4 | 10.4 |
| | F | 373 | 12.1 | 13.8 | 11.6 | 13.6 | 13.4 | 8.4 |
| CL+CLP | M | 1212 | 12.6 | 13.2 | 12.2 | 13.7 | 14.9 | 11.3 |
| | F | 642 | 12.6 | 13.2 | 12.3 | 5.6 | 10.4 | 7.8 |

| | | | ck 1/2 in % | | | ck 1/4—1/16 in % | | |
|----|---|-----|-------------|-------|---------|------------------|-------|---------|
| | | | durum | molle | submuc. | durum | molle | submuc. |
| CP | M | 359 | 7.1 | 5.0 | (18.4) | 8.0 | 8.3 | (6.1) |
| | F | 544 | 8.2 | 5.1 | (3.5) | 6.5 | 9.0 | (6.9) |

early diagnosis. Cleft forms not requiring surgical treatment (cicatrix, uvula fissa) have an even lower detection rate.

Each proband was examined for 17 data from the clinical materials. Anamnestic, epidemiological and genealogical follow-up of cleft defects is traditionally part and parcel of each patient's examination [2, 4, 5], which makes the material considerably complete, although we expect to obtain some of the more detailed information from specific investigations of the proband and the family, a practice in use over the past few years.

The information thus obtained was concentrated in a data bank open to more,

supplementary information. The more relevant results are assessed using the χ^2 test according to the usual criteria.

The sex ratio is expressed as the male share of the total where the total is equal to 1. $Sr = M/M+F$. M = male, F = female. The male share in per cent is produced by multiplying the figure by 100 ($Sr \times 100$), the female share in % = $(1 - Sr) \times 100$.

Table 5. Cleft palate subtypes (CP), sex ratio and familial incidence up to 1/16 coefficient of kinship. Hard palate clefts ("durum") are given with and without subgroup with hypoplasia of the mandible (+ hm). () = small numbers. Series from Bohemia, 1964–1983, n = 1012)

| Cleft | | n abs. | % | Sex ratio | Familial incidence | |
|-------|----------------|-----------|-------|-----------|--------------------|-----------|
| | | | | | % | sex ratio |
| CP | durum with hm | 59 | 5.8 | 0.322 | 15.3 | (0.333) |
| | without hm | 547 | 54.1 | 0.402 | 14.8 | 0.407 |
| | molle | 297 | 29.4 | 0.404 | 13.8 | 0.390 |
| | submucosum | 78 | 7.7 | 0.628 | 19.2 | (0.800) |
| | varium uvula | 5 | 0.5 | (0.400) | — | — |
| | Sedláčková sy. | 19 | 1.9 | (0.473) | 21.1 | (0.250) |
| | atyp. | 7 | 0.7 | (0.285) | — | — |
| | Σ | 1012 | 100.1 | 0.416 | 14.8 | 0.433 |

Familial incidence (fam.) is understood to mean another case of cleft among the kindred. Fam. $\frac{1}{2}$ denotes a cleft affecting a relative with the $\frac{1}{2}$ coefficient of kinship (father, mother, sibling). Fam. $\frac{1}{4}$ — $\frac{1}{16}$ denotes a case of cleft in a more distant rela-

Table 6. Relative shares of total cleft lip (T) is "complementary" in CL and CLP in terms of sex, and nearly identical in subtotal (S) cases

| | | Share in % | | | |
|----------|---|------------|------|--------------------|------|
| | | total | | familial incidence | |
| | | M | F | M | F |
| CL | S | 25.8 | 26.6 | 24.1 | 22.4 |
| | T | 7.6 | 15.3 | 7.1 | 14.2 |
| CLP | S | 14.2 | 12.5 | 14.7 | 14.2 |
| | T | 52.4 | 45.6 | 54.0 | 49.3 |
| Σ | | 100 | 100 | 100 | 100 |

tive with that particular coefficient of kinship, always rated by the nearest cleft-affected relative. Clefts affecting still more distant kindred are no longer rated as familial because such data were found unreliable.

Probability (p) is expressed in the usual manner in values of up to one, i. e., a phenomenon occurring in 50 % is rated as $p = 0.50$.

Table 7. Review of familial load at 1/2 coefficient of kinship (ck 1/2) according to cleft type and sex. Incidence in per cent (%), relative index (Ri) calculated as follows: load in men with CL = 1 absolute number of probands = n. M = male, F = female. In the CL..CLP..CP series ck indicates normal (Gaussian) distribution

| | Sex | ck 1/2 | | | | |
|----|-----|--------|---------|--------|-------|-------|
| | | CL | CLP | | CP | |
| | | | unilat. | bilat. | durum | molle |
| % | M | 3.4 | 5.8 | 10.4 | 7.1 | 5.0 |
| | F | 4.8 | 8.0 | 15.9 | 8.2 | 5.1 |
| Ri | M | 1 | 1.7 | 3.1 | 2.1 | 1.5 |
| | F | 1.4 | 2.4 | 4.7 | 2.4 | 1.5 |
| n | M | 415 | 577 | 230 | 239 | 120 |
| | F | 271 | 267 | 107 | 367 | 177 |

RESULTS

Table 1 shows the incidence of the basic types of cleft anomalies (in the Czech population). CL + CLP make up about $\frac{2}{3}$ of all clefts, CP about one third. The sex ratio is the highest in CLP, lower in CL, the lowest in CP. With regard to the degree of cleft lip (CP) we subdivided the patients into subgroup with subtotal cleft lip ("subtotalis" — S) and total cleft lip ("totalis" — T). Similarly, the CLP group was divided into subgroups S and T depending on the degree of cleft lip. The difference in the proportion of S and T clefts in CL and CLP is highly significant ($\chi^2 = 462$, degree of freedom 3, significant at 8.55⁻³² level), in other words, subtotal cleft is markedly more frequent in CL, total cleft in CLP. In cases of CP, 60 % of the clefts involve the hard palate ("durum"), about one third of the cases involve the soft palate only ("molle"), and only 8 % are submucous clefts. "Varium" (split uvula, Sedláčková's syndrome, atypical clefts) occur in only about 3 % of the cases. In terms of laterality, there are more right-sided and bilateral forms of cleft lip in CLP than in CL.

For further explanation it is important to note the relative order ratios between the basic cleft types in men and women (Tab. 1). We refer especially to, for instance, the CL : CP ratio in M and F (3 : 3 in M, 2 : 4 in F), or CL : CLP

in M = 3:6 (or 1:2), whereas in F it is 2:3. We shall try and explain those relationships in the Discussion section.

Table 2 gives a detailed classification of CL and CLP by the degree of cleft lip. Upper lip scar ("cicatrix") appears to be less frequent in our material than in the general population (see above). Cheiloschisis totalis "bilat. T+S" denotes bilateral cleft lip, total (T) on one side, subtotal (S) on the other side. The "bilat. T+T" subgroup covers cases of bilateral total cleft lip. At the close of the table we can see the rate of probability of CLP and CL developing in men (M), women (F), and in the total (M+F). Probability

$$P_x = \frac{CL_x + CLP_x}{CLP_x}$$

as in embryogenesis CLP invariably develops from CL. CLP probability can be used in photostopy for CLP risk estimation. This table, too, offers some theoretically important facts: the probability of CLP development is positively correlated with the degree of cleft lip with a conspicuous increase in cases of total cleft lip. The female sex is more resistant to the development of CL and CLP, right-sided clefts are more conducive to CLP, the sex ratio is lower in total CL than in subtotal CL, the sex ratio between subtotal CL and CLP differs less than that of the "total" group, etc. The differences in the rate of subtotal and total CL and CLP are highly significant in M as well as in F, and that in uni- and bilateral clefts at a level of significance ranging from 8.556^{-32} to 2.064^{-6} (χ^2). In the female sex the significance is lower, about one half, as women exhibit greater resistance to CLP.

Table 3 shows the correlation between the degree of cleft lip and the type of CP in CLP probands. CP is marked by an overwhelming predominance of hard palate clefts (92 %) which are more frequent in cases of total cleft lip. The other CP types ("non durum") are seen at a significant rate solely in subtotal cleft lip cases. This type of CLP is sometimes "separate cleft lip and cleft palate" [11] and may be seen as a separate nosological entity. At the same time, it serves as more corroboration of the great relevance of total CL for the development of CLP and cleft hard palate.

Table 4 reviews the familial loads of $\frac{1}{2}$ and $\frac{1}{4}-\frac{1}{16}$ in different forms of cleft. The degree of the load (fam. $\frac{1}{2}$ in %) is positively correlated with the gravity of the cleft, rising from CL to CLP, from unilateral to bilateral clefts, from CP molle to CP durum. In CL and CLP the load is quite regularly higher in women, whereas in CP to but a small degree in CP durum. The sexual difference in fam. $\frac{1}{2}$ is the highest in CL and CLP, while in CP durum there is just a hint of it, and in CP molle it is missing altogether. In bilateral CL the percentage of the load is low as this is a small subgroup, and a shift to CLP can be expected under load. The more distant familial involvement ($\frac{1}{4}-\frac{1}{16}$) is, on the contrary, in a moderate negative correlation with the degree of the cleft, most conspicuously so in women with bilateral CLP. This tendency is suggested in CP, too. This appears to be due to the fact that a more remote familial load is not "big enough" to produce CLP, which is why the load is

found in CL. With fam. $\frac{1}{2}$ and fam. $\frac{1}{4}$ — $\frac{1}{16}$ put together, the differences become obliterated, which is why no clear description of them has been made yet.

Table 5 is a review of CP subtypes. This is where we included cases of independent uvula fissa although they are very rare in clinical material as distinct from the general population. The familial occurrence of Sedláčková's syndrome (4 cases) is an interesting discovery. Some of the cases classified as belonging to this syndrome are likely to have a common denominator with clefts. The sex ratio is the lowest in hard palate clefts with hypoplasia of the mandible ("durum + hm") and the highest in submucous clefts which are noted for a high degree of familial load and treated separately from the CP group for other reasons, too (occurrence in CLP).

DISCUSSION

Before interpreting the above data we wish to state a few premises:

1. Cleft lip begins to develop from the 27th—30th day of embryogenesis, i. e., about a fortnight before cleft palate. Consequently, CL may influence the development of CLP, never the other way round. The morphogenetic systems responsible for the development of clefts have a common denominator in the starting facial structure so that different types of cleft such as CL and CP may also develop "independently" of each other. From the purely formal point of view, it should be borne in mind that CL may be CLP-CP, and vice versa, CP may be CLP-CL.

2. Population can be understood to mean a relatively closed, dynamic system (in genetics modelled with the aid of Hardy-Weinberg's law). Our series gives a fairly accurate idea of cleft anomalies in Bohemia so that a loss in some type of cleft may add to an increase in some other subgroup. For instance, if CL develops into CLP we can detect this, e. g., by means of the sex ratio, familial load, numerical ratios, etc.

3. We use the familial load factor to find out about the proband's genetic disposition. Fam. $\frac{1}{16}$ tells us that the proband has $\frac{1}{16}$ "blood" in common with another affected member of the family, or just $\frac{1}{16}$ of the disposition factors (disregarding the population distribution, of course). Taking into account the possibilities of recombination and our ignorance of the share of exogenous factors we can see that this is a considerably non-standard type of load. Hence why we chose to evaluate the load at the coefficient of kinship of $\frac{1}{2}$ where the proband is given, on average, one half of the genetic information which in a relative of his (or her) was "sufficient" to start a cleft. This makes the cases better comparable though not even here can the effect of recombination and exogenous factors be ruled out altogether.

Clefts are markedly different in terms of the sex ratio. Men are the most profusely represented in CLP, less so in CL, and the least in CP (Tab. 1). The usual description of that situation is that M are inclined to CL and CLP, F to CP. If CP were easier to develop in women, then women would have to have

a less frequent familial load than men with CP. CP women, however, are noted for an even slightly higher fam. $\frac{1}{2}$. This gives rise to a major contradiction as there are more CP women than CP men in the population. A possible explanation is that some (?) women with CP are, in fact, cases of "CLP" where, however, cleft lip failed to develop because women are prominently more resistant to CL (Tab. 2, 7). Indirect proof of this is that in a number of families we come across CL, CLP and CP clefts in blood relations. The relative ratios in Tab. 1 would also seem to support this hypothesis (e. g. in M CL : CLP = 3 : 3, in F 2 : 4, and so on). However, we see direct evidence of this in the existence of "reciprocal balance in cleft defects" which we were able to find in our series of probands: a study of the sex ratio in probands born over periods of two years each showed the CLP sex ratio variation to be negatively correlated to sex ratio changes in CP, CLP and CP then seem to behave as a definite entity in the population (2).

A comparison of CL and CLP shows the striking fact that subtotal cleft lip predominates in CL whereas total cleft lip is the major feature of CLP. The probability of CLP development gives an even more accurate picture of this (Tab. 2). Total CL appears to result in a more conspicuous displacement of facial processes, thus influencing the development of cleft palate and, ultimately, CLP. This is corroborated also by the fact that bilateral subtotal CL is less likely to lead to CLP than total unilateral CL.

The female sex has a lower probability of CLP resulting from CL (Tab. 2), $p = 0.580$, in men $p = 0.660$. That is why more women remain in the CL group and why the sex ratio is lower there than in CLP. More proof of this is that in total CL with a high degree of probability of CLP development the sex ratio in CL is lower than in CL with subtotal clefts as men are more susceptible to CLP development. These connections are listed in Table 6. The table gives in relative values (per cent) the "complementary" incidence of total clefts in M and F, i. e., a higher rate in women as regards CL, in men as regards CLP. The table also shows that this "complementary" incidence remains the same even if there is a familial load, i. e., unaffected by familial involvement. Consequently, this different sex-linked susceptibility appears to be conditional upon sexual dimorphism already in this early period of embryogenesis. The female sex greater resistance to CL and CLP can also be seen in the usually lower sex ration of the probands in cases of familial load since women obviously "require" a higher degree of familial load for the development of the same type of cleft as in men (Tab. 4). Details of fam. load $\frac{1}{2}$ are given in Table 7. With the exception of CP molle, this load is always greater in women. From the table we can also estimate the degree of risk for the probands' offspring, a factor depending on the degree of the cleft and on the child's sex. For instance, a CLP-woman is expected to run a risk 5 times as high as a CL-man. The risk of cleft development will be greater for her sons.

The situation might be similar in cleft anomalies conditional upon non-genetic factors, i. e., the degree of load might well be correlated with sex and with the gravity of the cleft. This could perhaps be exploited for testing suspect exogenous influences in clinical material. For instance, the expectant

mother's increased temperature at the time the foetus is in the critical period of embryogenesis could be detected more often in the major forms of cleft in proportion to the rate of familial incidence. This would, at the same time, provide evidence of the embryotoxicity of the suspected agent, and, in this respect, cleft anomalies could serve as a testing model for exogenous factor detection.

Fam. $\frac{1}{4}$ — $\frac{1}{16}$ is less frequent in the gravest forms of cleft, mainly in women (Tab. 4). This lesser familial load apparently is not weighty enough to produce major clefts; consequently, the milder forms develop to be classified in the respective subgroups, thus increasing the relative number of lower-load familial cases. However, this situation is not quite in agreement with the multifactorial type of cleft determination, but rather with the oligofactorial type of genetic disposition transmission (di-trifactorial).

In our opinion, our material seems to justify the conclusion that cleft anomalies as a whole behave as a quantitative defect (characteristic) where the degree of cleft depends on the quantity of the aetiological (genetic and exogenous) agent, and where other correlations of a quantitative nature are involved at the same time. The sex ratio in clefts can, in principle, be put down to a higher resistance in women (sexual dimorphism) and to the fact that, given a free recombination of genetic factors in the population, an individual is less easy to accumulate as many of them as are required for a woman to develop a cleft. This would explain why some women with "predisposition" to CLP will fail to develop CL with the result that there are more women in the CP group. For much the same reasons, there are fewer women with bilateral CLP, etc. We further believe that in terms of research the classification of clefts into genetic groups I and II is unfounded and unrelated to the objective situation. Moreover, that kind of classification makes us implicitly look for differences between those groups and overlook their interrelationships.

The sex ratio for CL development in embryogenesis (regardless of whether it will later develop into CL or CLP) is given by the sum of CL + CLP and is equal to 0.655 (Tab. 2), in other words, the male sex is affected almost twice ($1.9\times$) as often as the female sex. Women are thus left with a "latent" disposition which may become manifest in the development of CP.

SUMMARY

The authors investigated the catchment area of Bohemia (6 mil. inhab.) to single out 3,399 probands, born 1964—1983, with cleft lip (CL), cleft lip and palate (CLP) and isolated cleft palate (CP) at about 90 % truncate selection. Excluded were associated syndromes except Pierre Robin's and Sedláčková's syndromes. A total of 2,879 probands were rated. Cleft subtype percentages are given in Tab. 1, 2 and 5. At familial incidence of $\frac{1}{2}$ coefficient of kinship to the proband, there is a prominent positive correlation with the degree of cleft, the load growing from CL to CLP, from mono- to bilateral clefts, from CP molle to CP durum, from the male to the female sex. In CLP-women this load is 4.7

times more frequent than in CL-men. In contrast, there is a moderate negative correlation in cases of more distant familial load ($\frac{1}{4}$ — $\frac{1}{16}$). CL+CLP was studied for the probability of CLP developing from CL, a value positively correlated with the degree of CL and rising in the series of cicatrix, subtotal, total (mono—bilateral) CL, apparently in relation to the lateral displacement of facial processes in embryogenesis. Seen from this point of view, clefts as a whole behave as a "quantitative characteristic". Theoretically speaking, the male sex in embryogenesis is twice as susceptible to CL than the female sex, an another $\frac{1}{4}$ as much to CLP. The lower sex ratio in CL as distinct from CLP is explained by the male sex greater readiness to develop CL into CLP, the low sex ratio for CP to the female sex greater resistance to developing CL. Submucous clefts differ from CP by their higher sex ratio and familial load. From these points of view, CP represents a heterogenous group.

RESUME

La fente labiale et palatine: variabilité dans la population tchèque, sex ratio et l'apparition familiale

Černý, M., Fára, M., Hrivnáková, J., Moucha, L.

De tout le territoire administratif de la Bohême (6 mllns. de habitants) nous avons enregistré à la Clinique 3399 de sujets nés dans les années 1964—1983, qui ont été atteints de la fente labiale (CL), de la fente totale (CLP) et de la fente palatine isolée (CP), avec le taux d'enregistrement approximatif de 90 % (truncate selection). On a éliminé les syndromes associés, à part les anomalies de Robin et le syndrome de Sedláčková. Dans l'ensemble nous avons évalué 2879 de sujets. La proportionnalité des sous-types de fentes est introduit aux tableaux 1,2 et 5. Quant à l'apparition, familiale, avec le coefficient $\frac{1}{2}$ de parenté par rapport au sujet, on constate une considérable corrélation positive, adéquate au degré d'atteinte de la fente. La charge augmente de CL à CLP, des fentes unilatérales aux fentes bilatérales, de CP molle à CP durum, d'hommes aux femmes. La charge est 4,7 fois plus fréquente au cas de CLP chez une femme que celle de CL d'un homme. Si la charge familiale est plus reculée ($\frac{1}{4}$ — $\frac{1}{16}$) on constate plutôt une légère corrélation négative. La probabilité de l'apparition a été déterminée pour la réciprocity de CL avec CLP: CLP se développe à partir de CL. Cette apparition se trouve en corrélation positive par rapport au degré de la fente labiale: cicatrix, subtotalis, totalis (mono-bilateralis), apparemment en dépendance de la dislocation latérale des extrémités faciales en embryogenèse. Sous ses aspects, les fentes dans l'ensemble se comportent comme un «signe quantitatif». Théoriquement, la tendance à l'apparition de CL au stade d'embryogenèse est 2 fois plus grande chez les hommes que chez les femmes et celle de CLP augmente encore d'un quatrième. Sex ratio de CL est inférieur à celui de CLP, ce qui est expliqué par un transfert plus facile de CL à CLP chez les hommes. Sex ratio bas de CP s'explique par une plus haute résistance des femmes à l'apparition de CL. Les fentes submuqueuses se distinguent de CP par sex ratio plus élevé et par la charge familiale. Sur ce point de vue, CP se porte comme un groupe hétérogène.

ZUSAMMENFASSUNG

Lippen- und Gaumenspaltung: Variabilität in der tschechischen Bevölkerung, Anteil der Geschlechter und Familienvorkommen

Černý, M., Fára, M., Hrivnáková, J., Moucha, L.

Im Gebiet von Böhmen (6 Mill. Einwohner) wurden auf der Klinik 3399 Probanden, geboren 1964–1983, mit Lippenspaltung (CL), gesamter Spaltung (CLP) und isolierter Gaumenspaltung (CP) bei etwa 90 % Erfassung (truncate selection) festgestellt. Ausgeschlossen wurden assoziierte Syndrome mit Ausnahme der Robin'schen Anomalie und dem Sedláčková Syndrom, sodass insgesamt 2879 Probanden eingeschätzt wurden. Das Vorkommen von Spaltungs-Subtypen ist in den Tafeln Nr. 1, 2 und 5 angeführt. Bei Familienvorkommen mit $\frac{1}{2}$ Verwandtschaftskoeffizienten zum Probanden ist die positive Korrelation mit dem Grad des Spaltungsdefekts ausgeprägt, wobei die Belastung von CL zu CLP ansteigt, von monolateralen zu bilateralen Spaltungen, von CP molle zu CP durum, von Männern zu Frauen. Bei der Spaltung CLP ist diese Belastung bei Frauen 4,7-mal häufiger als bei Männern die CL-Spaltung. Bei entfernterer Verwandtschaftsbelastung ($\frac{1}{4}$ – $\frac{1}{16}$) gibt es im Gegenteil eine leichte negative Korrelation. Bei CL + CLP wurde die Wahrscheinlichkeit der Entstehung von CLP aus CL bestimmt, die in positiver Korrelation zum Grad der Lippenspaltung steht: Cicatrix, Subtotalis, Totalis (mono- u. bilateralis), offensichtlich in Abhängigkeit von lateraler Dislokation der Gesichtsvorsprünge in der Embryogenese. Die Spaltungen als Ganzes benehmen sich von diesen Gesichtspunkten aus als „quantitative Anzeichen“. Theoretisch besteht bei Männern in der Embryogenese eine doppelt so hohe Tendenz zur Entstehung einer CL sowie um ein weiteres Viertel so hohe Tendenz zur CLP als bei Frauen. Das niedrigere Verhältnis bei CL gegenüber CLP erklärt sich durch die einfachere Verschiebung bei Männern von CL zur CLP, die niedrigere Anteil des Geschlechts bei CP durch die grössere Widerstandsfähigkeit der Frauen gegen die Entstehung von CL. Submukose Spaltungen unterscheiden sich von CP durch einen höheren Anteil des Geschlechts und der Familienbelastung. CP ist von diesem Gesichtspunkt aus eine heterogene Gruppe.

RESUMEN

La hendidura del labio y del paladar: variabilidad en la población checa, sex ratio y la frecuencia familiar

Černý, M., Fára, M., Hrivnáková, J., Moucha, L.

Del región determinado de Chequia (6 mln. de la población) en la clínica fué registrado 3399 de probados, nacidos en el período desde 1964 hasta 1983 con la hendidura del labio (CL), la hendidura total (CLP) y la hendidura aislada del paladar (CP), con la captura aproximal en 90 % (truncate selection). Fueron excluidos los síndromas asociados excepto la anomalía de Robin y el síndrome de Sedláčková; en total valuaron a los 2879 probados. La representación de subtipos de las hendiduras está mostrada en las tabúlas 1, 2 y 5. En la frecuencia familiar, con coeficiente del parentesco al probado en $\frac{1}{2}$, existe una expresiva correlación positiva con el grado de la anomalía de la hendidura, la carga aumenta desde CL hacia CLP, desde mono- hacia las hendiduras bilaterales, desde CP molle hacia CP durum, desde los hombres hacia las mujeres. En CLP de la mujer está carga es en 4,7 veces más frecuente, que en CL del hombre. En la carga familiar más lejana ($\frac{1}{4}$ – $\frac{1}{16}$), al revés, existe la correlación negativa moderada. En CL + CLP fué determinada la probabilidad de la formación de CLP desde

CL, la que está en la correlación positiva con el grado de la hendidura del labio: cicatrix, subtotalis, totalis (mono-bilateralis), evidentemente en la condición de la dislocación lateral de saledizos faciales en la embriogénesis. Las hendiduras en su totalidad de éste aspecto se mantienen como "un siglo cuantitativo". Teoréticamente en los hombres en la embriogénesis existe en 2 veces más gran tendencia para la formación de CL y en siguientes $\frac{1}{4}$ para CLP, en comparación con las mujeres. Más bajo sex ratio en CL en comparación de CLP se puede explicar por más ligero avance desde CL en CLP, y por bajo sex ratio en CP por más gran resistencia de las mujeres contra la formación de CL. Las hendiduras submucosas diferencian de CP por más alto sex ratio y por la carga familiar, CP de estos aspectos forma un grupo heterogéneo.

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NASAL SEPTUM REPOSITION IN UNILATERAL CLEFTS AS AN INTEGRAL PART OF PRIMARY SUTURE OF THE LIP

J. Hrivnáková, M. Fára

Cleft lip and palate pose one of the most intricate and difficult problems a plastic surgeon is expected to deal with. Clefts require comprehensive, surgical-conservative treatment in team work based on the concerted efforts of the surgeon, stomatologist, phoniatician and many other specialists, all in pursuit of a single aim: to help cleft victims get rid of their actual physical inferiority and, thereby, of a serious subjective feeling of inferiority, thus to enable them to become integrated in society as equals.

Surgical treatment has long since ceased to consist in the simple suture of the edges of the cleft parts. The proper aim is to achieve physiological reconstruction of the cleft-affected region. To achieve that, we have to meet a number of requirements.

1. To determine the right schedule of the particular phases of surgery with regard to the growth periods of the regions planned for surgery and to the fact that any surgical operation will impede natural development for a certain, albeit short, period of time.

2. To make the correct decision on which structure will grow full size and improve its shape by mere integration in a functional whole (the prolabium in bilateral clefts), and which is really deficient and requiring complementation.

3. Tissue deficiency to be filled either by transfer from the nearest site (augmentation of the hypoplastic philtral skin edge on the upper lip using a tiny flap from the lateral edge of the lip), by transplantation from remote parts of the body (bone transplantation to fill the maxillary defect), or by reposition (retroposition of a short palate).

4. Atypically localized or deformed tissues to be given their natural shape (raising the nasal tip cartilages, nasal septum reposition or correct direction (detachment of the proximal cleft insertions of the muscles of the lip and palate and their turning into the horizontal course).

5. To stimulate a more favourable development of the structures concerned by restoration of the neighbouring functional structures (reconstructed

lip muscle and its effect on maxillary development) or by supplying tissues complete with their vascular and nervous supply (musculomucous pharyngeal flap and its effect on accelerated rehabilitation of the palate).

6. To operate physiologically, in particular, to avoid bruising tissues or mobilizing the periosteum in the vicinity of budding teeth, or expos-



Fig. 1 Typical deformations of cartilaginous septum in left-sided cleft (postmortem of a still-born child)

ing defects to subsequent cicatrization (pharynx at the site of the mobilized flap), and to choose the right size of mobilization to avoid traction, suture, etc.

7. To speed up the restoration of function in the reconstructed tissues by all appropriate means of rehabilitation, especially massages, lip and palate movement exercise, and logopaedic exercises.

Most surgeons take the necessary pains to meet the above requirements as a condition for the successful outcome of the cleft operation. Nevertheless, little is so far known of the importance of primary reposition of the cartilaginous nasal septum in unilateral clefts, and that not only by its detachment from the maxilla but also by its straightening into an entirely upright position in the tip of the nose. This is because the cartilaginous septum is, in its distal insertion, deviated, together with a large segment of the maxilla, towards the unaffected side, and not only there but also in the tip of the nose where it may be deviated often as far as the horizontal position. The mobilization from the maxilla requires blunt separation without

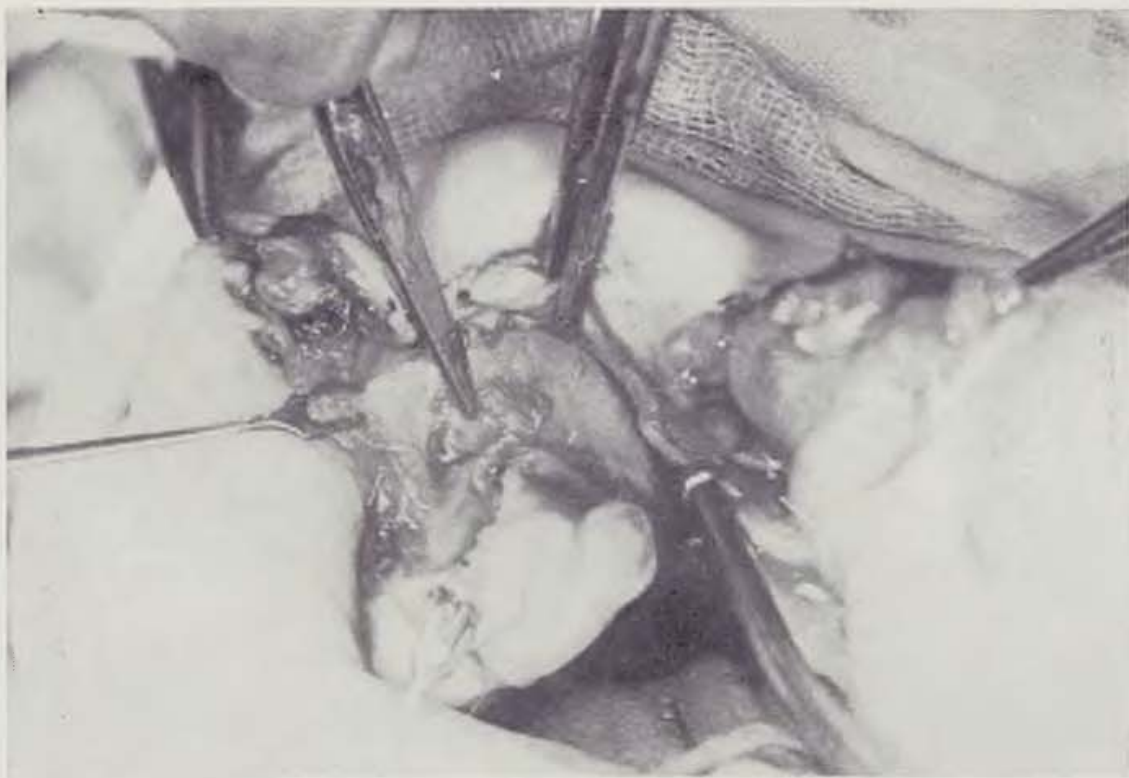


Fig. 2 Cartilaginous septum deviation in a unilateral cleft as seen at surgery



Fig. 3 Post-reposition state at the base and tip of nose



Fig. 4 Patient K. H., clin. rec. No. 65387, total left-sided cleft



Fig. 5 The same patient at 8 days after primary suture of the lip with septum straightened at nasal base and tip



Fig. 6 Same patient at the age of 4 years. — Fig. 7 Same patient at 20 years without any corrective surgery

the use of scalpel incisions, about half way up the cartilaginous septum. At the tip of the nose, mobilization starts from an incision between the skin and cartilage, the upper edge of the septum to be mobilized again by blunt dissection in what should be a very careful process to separate it from the nasal tip cartilages, thus permitting the deformed upper segment of the septum to straighten up mostly spontaneously.

The above described manoeuvre on the septum requires fine surgery and often even patience, though in the overwhelming majority of the cases it will make for a natural subsequent development of the nose and avoid what used to be secondary deviations of the nasal axis or deformations of the tip of the nose, thus eliminating secondary operations on the nose by means of osteotomy and nasal tip cartilage elevation.

SUMMARY

The authors stress the importance of primary reposition of the septum, both at the base and at the tip of the nose, as an essential part of primary suture of the lip. This approach creates the conditions necessary for a largely natural, subsequent development of the nose without what used to be severe deformations requiring difficult secondary operations.

RESUME

L'importance de reconstruction de la cloison de nez chez les divisions unilatérales comme partie indivisible de la primaire de lèvre

Hrivnáková, J., Fára, M.

Les auteurs soulignent l'importance de la reconstruction primaire de la cloison de nez, à la base même qu'au niveau de la pointe de nez. La reconstruction représente une partie indivisible de la suture primaire de lèvre. Dans le temps ultérieur, l'intervention garantira une évolution relativement naturelle du nez, sans graves déformations d'antécédents qui avaient nécessité de difficiles interventions secondaires.

ZUSAMMENFASSUNG

Die Bedeutung einer Reposition der Nasenscheidewand bei einseitigen Spaltungen als ein untrennbarer Bestandteil einer primären Lippennaht

Hrivnáková, J., Fára, M.

Die Autoren betonen die Bedeutung einer primären Reposition der Scheidewand sowohl an der Basis als an der Nasenspitze als einen untrennbaren Bestandteil einer primären Lippennaht. Eine solche Operation sichert eine erheblich natürliche weitere Entwicklung der Nase ohne die ehemaligen schweren Deformierungen, die komplizierte sekundäre Eingriffe erfordern.

RESUMEN

Significado de la reposición del tabique nasal en hendiduras unilaterales como parte integrante de la sutura primaria del labio

Hrivnáková, J., Fára, M.

Los autores subrayan el significado de la reposición primaria del tabique nasal, tanto en la base como en la punta, como parte integrante de la sutura primaria del labio. Esta operación asegura una evolución posterior de la nariz bastante natural, lo cual no se logra con los métodos anteriores que provocan graves deformaciones que exigen difíciles operaciones secundarias.

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TIBIAL RECONSTRUCTION WITH FREE RIB LATISSIMUS DORSI OSTEOMUSCULOCUTANEOUS FLAP

Y. Maruyama, Y. Okajima, T. Yoshida, M. Motegi

Rib-latissimus flap

The free latissimus dorsi musculocutaneous flap is a highly useful flap that has become common in treating the lower leg poorly supplied by blood or complicated by skeletal injuries (1—3). In case of complex and compound defects, the free osteocutaneous flap is the procedure of choice (3—5). This article presents a case in which a free latissimus dorsi osteomusculocutaneous flap including two ribs was transferred to the tibia to fill a structural skeletal support and a soft tissue coverage.

Case report

A 34-year-old male sustained open fractures of his left tibia and fibula with a loss of the lower portion of tibia as a result of motor-cycle accident (Fig. 1a, b).

We planned to repair the defect by using a free rib-latissimus dorsi osteomusculocutaneous flap to provide skin cover and bone support.

Pre-operative angiography revealed that the anterior tibial artery was intact but that the posterior tibial artery had been ligated during the primary treatment.

In operating, scars were excised and the posterior tibial artery and vein were traced and prepared proximally. External bone fixation was carried out and the recipient site prepared. Vertical incision was made in the right dorsal region anterior to the latissimus dorsi, and the dissection was made posteriorly deeply in the muscle.

In the distal portion (over 9th and 10th ribs), a deep dissection was made through the intercostal muscles as far as the costal bone, and care was taken not to damage the vascular connection between the latissimus dorsi and intercostal vessels. The flap was then elevated from the thoracic wall. The circulation of the entire flap was confirmed, fresh bleeding noted from all the tissues, including the entire cut surface of bone, the periosteum, and attached

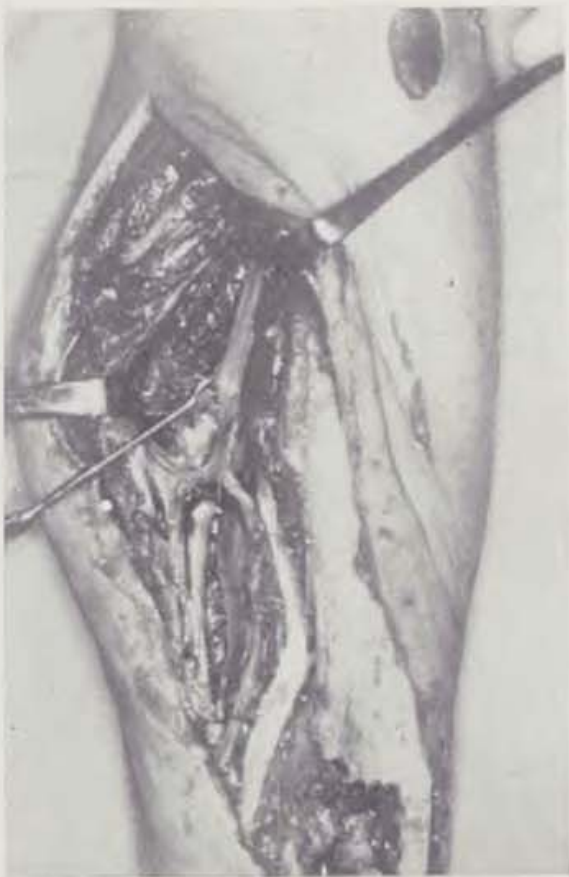


Fig. 1a Preoperative view shows skin and bone defect. — Fig. 1b X-ray shows fractures and tibial bone defect

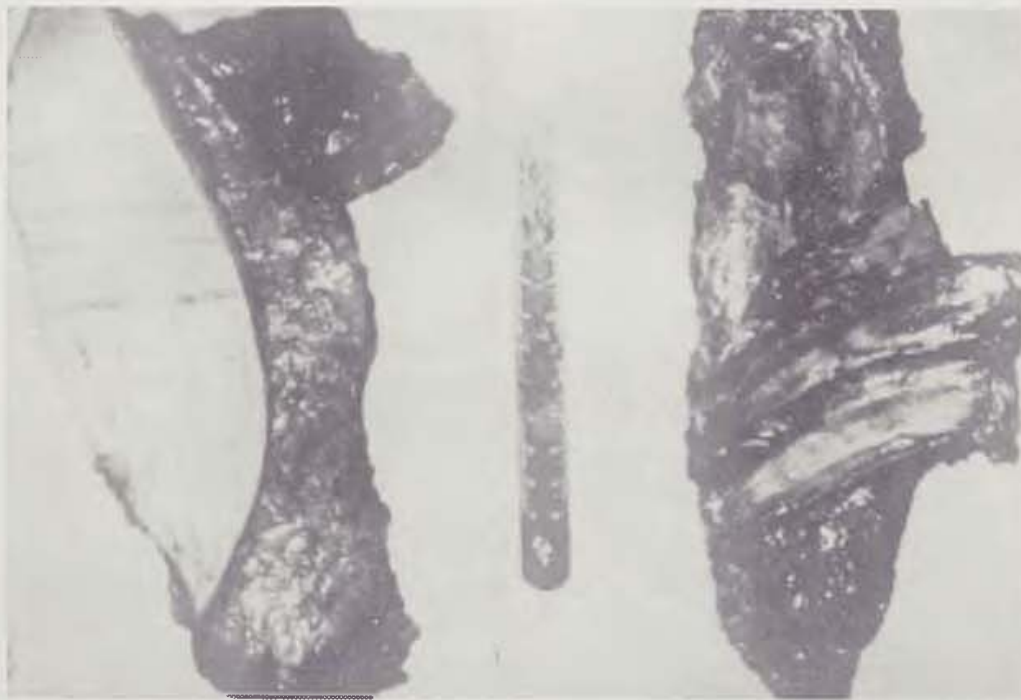


Fig. 2 Detached flap measured 21 × 8 cm included two ribs

muscles as well as the skin muscle edges. The flap including two 12 cm long costal bones, measured 21 X 8 cm (Fig. 2) was transferred to the left lower leg, where the 10th costal bone was inserted into the tibial bone, and the 9th was trimmed to fit the tibial cortical defect well, and fixed with Kirchner wires. Excess bone was chipped and applied around them (Fig. 3).

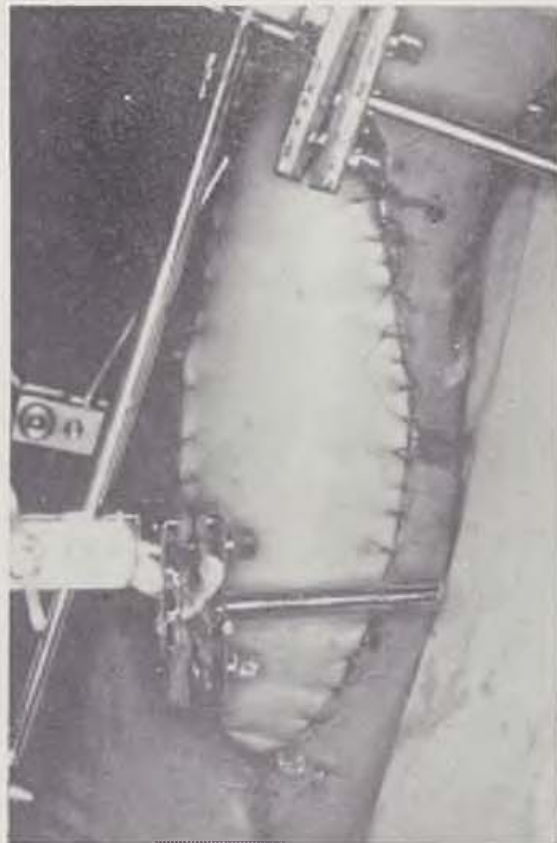
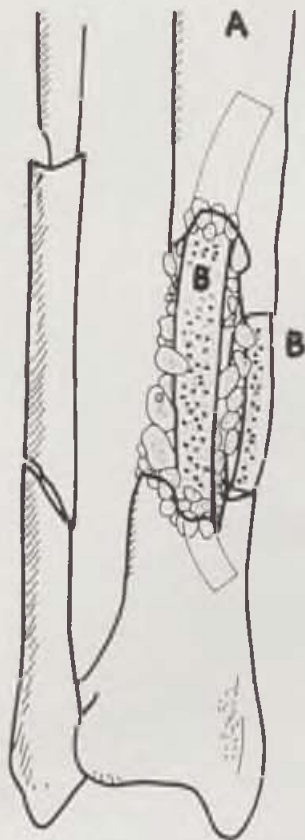


Fig. 3 Schema of rib transplants to the tibial defect, A — tibia, B — rib. — Fig. 4 Immediate result

The thoracodorsal and posterior tibial arteries were anastomosed end to end and the flap immediately became pink and full of blood (Fig. 4).

The tibial wounds were closed in two layers, incorporating Penrose drains. The entire flap survived, and the postoperative course was uneventful.

A bone scan (Technetium 99) a week after surgery revealed that the transplanted ribs had been accepted suggesting that this type of transplant is viable. Plain x-rays showed no evidence of absorption during the follow up. Twelve weeks after the operation, the patient began to practice standing on the operated leg, and found that it was able to support him. At sixteen weeks, the external fixation was discontinued and replaced with a patella tendon brace. An x-ray taken twenty eight weeks postoperatively revealed a complete bone union, and the patient is now able to read a normal life (Fig. 5a, b).

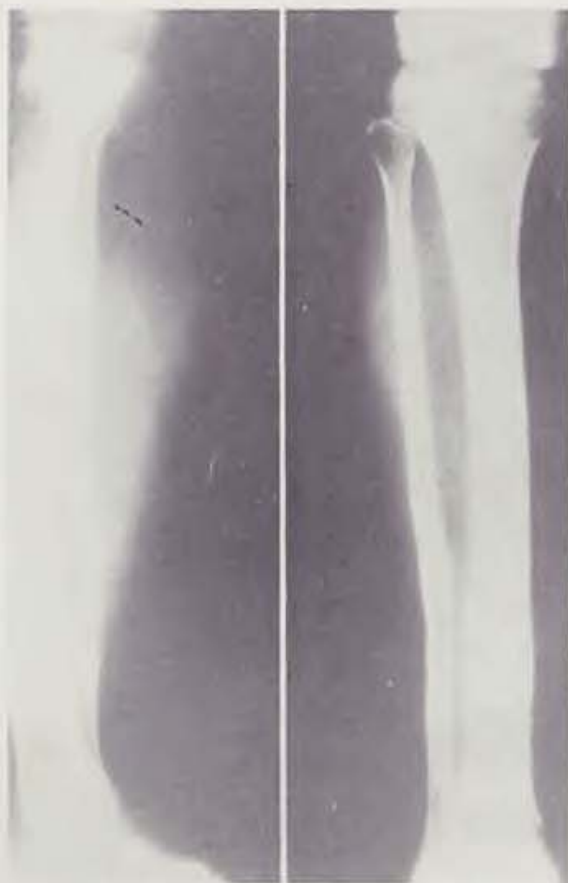


Fig. 5a Two years later X-ray showed sound bony union and no absorption of bone in the reconstructed tibia

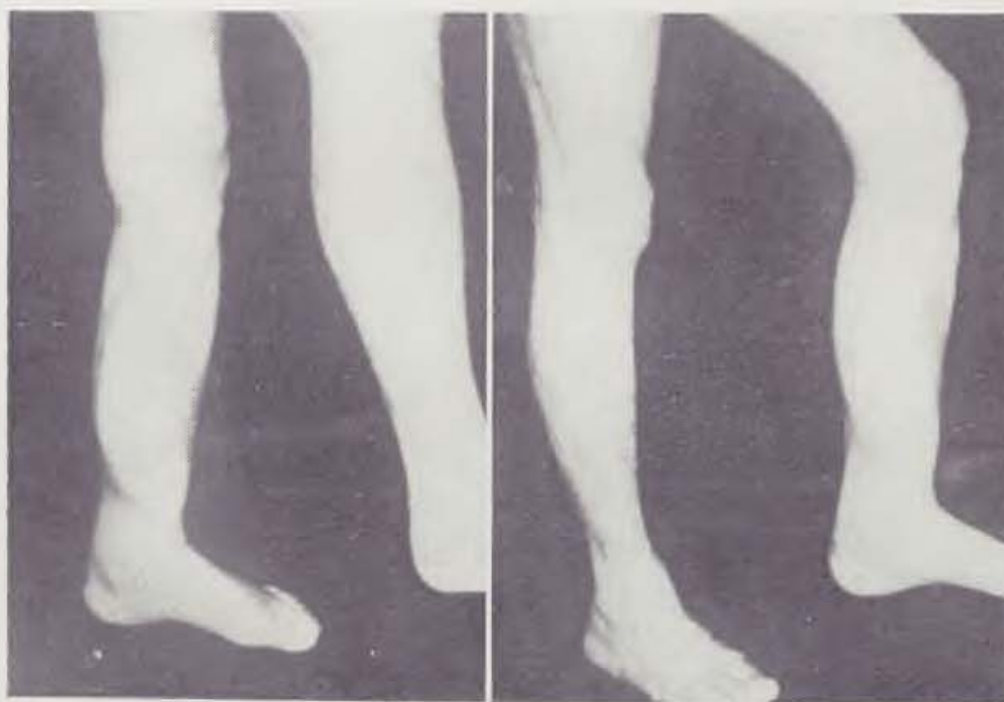


Fig. 5b Postoperative view two and half year later

DISCUSSION

In the management of compound injuries of lower extremities, soft tissue coverage is the most essential factor (3).

Local skin, muscle and musculocutaneous flaps may be used, but are limited in the area they can cover especially in a difficult area like the lower extremity. The latissimus dorsi musculocutaneous free flap is a useful alternative (1—5).

The latissimus dorsi covers the lower ribs from the midline to the posterior axillary line. The perforating branches arise from the posterior inter-costal artery and pass upward into the overlying latissimus dorsi muscle and skin. This anatomical vascular arrangement involving the latissimus dorsi muscle and the intercostal vessels guarantees the integrity of compound flap transfers that include the underlying rib, nourished by an intact periosteal circulation (6).

Buncke described a free osteocutaneous flap extending from a rib to the tibia, but the transplanted bone fractured (7). In our case we used two ribs, which perhaps provided the necessary structural support.

SUMMARY

This report describes a one stage reconstruction of a tibial complex defect with a free rib-latissimus dorsi osteomusculocutaneous flap. The entire compound flap including two ribs took well. The transplant was confirmed viable by a bone scan and x-rays, and revealed that the transplant had provided excellent structural support in the follow ups.

RESUME

Reconstruction de la jambe par une greffe libre du lobe vertébro-dermo-musculaire de musculus latissimus dorsi

Maruyama, Y., Okajima, Y., Yoshida, T., Motegi, M.

Description d'une reconstruction, effectuée en un temps opératoire. Il s'agissait d'un défaut complet du tibia, reconstruit en aide d'un lobe vertébro-dermo-musculaire de musculus latissimus dorsi. Le greffon, qui contenait même deux vertèbres, a prouvé une bonne vitalité. Il a été bien pris et — lors de l'observation ultérieure (rayons X, scanning des os) — le greffon a servi d'un excellent appui structural.

ZUSAMMENFASSUNG

Die Rekonstruktion des Schienbeins durch einen freien Lappen aus Rippe, Haut und Muskel des musculus latissimus dorsi

Maruyama, Y., Okajima, Y., Yoshida, T., Motegi, M.

Es wird die einmalige Rekonstruktion eines komplexen Schienbeindefekts unter Verwendung eines freien Lappens aus Rippe, Haut und Muskel des musculus latissimus dorsi beschreiben. Der Pfropfen, der auch zwei Rippen umfasste, erwies seine Lebensfähigkeit, heilte gut ein und bot bei der weiteren Beobachtung mittels Roentgenstrahlen und Skanieren der Knochen eine ausgezeichnete strukturelle Stütze.

RESUMEN

Reconstrucción de tibia mediante lóbulo libre, compuesto por costillas-piel-músculos de musculus latissimus dorsi

Maruyama, Y., Okajima, Y., Yoshida, T., Motegi, M.

Se presenta la descripción de la técnica para la reconstrucción por única vez del defecto complejo tibial, con ayuda del lóbulo libre constituido por costilla-piel-músculos de musculus latissimus dorsi. El injerto, que incluía 2 costillas, mostró viabilidad, buena cicatrización, y durante exámenes posteriores con ayuda de rayos X y barrido de huesos, presentó un excelente sostén estructural.

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FREE INGUINAL FLAP AND ITS USES

M. Tvrdek

The groin is one of the first sites to have been used for the withdrawal of a free skin flap.

The inguinal region is supplied by two main arteries — the superficial circumflex iliac artery and the superficial epigastric artery. The former is always present and follows a constant course, the latter is not quite so constant, and may be even missing. In most cases, the two arteries branch off from the femoral artery, though they may also take their origin from the deep femoral artery, the deep circumflex iliac artery, etc. The superficial circumflex iliac artery branches off about 2 cm below the inguinal ligament from the anterolateral side of the femoral artery towards the anterior superior iliac spine where its deep branch at the site of the sartorius muscle runs subfascially. The superficial epigastric artery takes its origin from the anteromedial side of the femoral artery and, close to the inguinal ligament, it turns upward to the hypogastrium.

Drainage is provided by the superficial and deep venous systems, the former being made up of the superficial circumflex iliac vein and the superficial epigastric vein, the latter by the concomitant veins of the arteries.

Several basic structures are used to mark out the flap: the course of the inguinal ligament, the course of the femoral artery, and the superior anterior iliac spine. The flap axis is the connecting line between a point 2 cm below the inguinal ligament on the femoral artery representing the point of origin of the vascular pedicle and the spine (Fig. 1).

To mobilize the flap we proceed from the lateral edge towards the vascular pedicle, which gives us a good view of the course of the axial vessels as well as a good opportunity to isolate their origin from the trunk.

CASE REPORTS

1. Patient S. J., a woman aged 28, suffered in infancy burns in the frontoparietal region. Several bone defects, 2 cm in diameter, developed at the site of affection. As a primary measure, the patient was treated with dermoepidermal grafts. However, easy vulnerability and the development of chronic ulcerations required replacement with a good-quality skin cover (Fig. 2). The

scarred region was excised, and the defect was covered with a free inguinal flap, 20 by 14 cm in size. The flap pedicle vessels were anastomosed to the superficial temporal vessels (Fig. 3). The secondary defect was closed, in part, by direct suture, and the residual area was covered with a dermoepidermal transplant.



Fig. 1 Inguinal flap marked out: dashed line — course of inguinal ligament, cross = superior anterior iliac spine, AVF = femoral vessels

2. Patient M. V., a man aged 44, suffered amputation injury of the left leg in the crural region, and amputation of the right-foot big toe with dilaceration of the heel. The heel developed a chronic, infected defect refractory to conventional methods (Fig. 4). Following excision of the defect and its scarry surroundings, a branch of the posterior tibial artery and its concomitant veins were exposed at the tibial ankle level. The inguinal flap vessels were anastomosed to those vessels (Fig. 5). The secondary defect was closed by direct suture.

3. Patient T. V., aged 25, suffered 3rd-degree burns involving 40 % of the body surface. A severe cicatricial contracture developed in the cervical region causing the chin to be drawn to the chest and the lower lip to become everted (Fig. 6). First, the oral opening was extended. The second phase involved, as a first measure, the transverse transsection of the cervical scar in local anaesthesia to permit intubation. Then followed excision of the large scars, including the scarred m. platysma. The skin cover was replaced with a free inguinal flap with its vascular pedicle anastomosed to facial vessels (Fig. 7).

4. Patient M. L., aged 7 years, the casualty of a car accident, suffered a devastating injury of the left half of the face with loss of skin cover, damage



Fig. 2 Scar resulting from burns in the frontoparietal region with numerous exostoses —
Fig. 3 State after operation



Fig. 4 Chronic defect of right foot heel — Fig. 5 State at 1 month after surgery



Fig. 6 Cicatricial contracture of the neck resulting from burns — Fig. 7 State at 3 weeks post-operatively



Fig. 8 State following severe dilaceration of left half of face with frontal bone defect and loss of eye. Wound healed with dermoepidermal graft — Fig. 9 State at 3 weeks after free inguinal flap transfer

to the orbit, and loss of the eye. A frontal bone defect developed, too. As a primary measure, the skin defect was healed with dermoepidermal grafts (Fig. 8). In a secondary operation, the skin cover was replaced with a free inguinal flap representing also a reserve of material for the reconstruction of the left ala nasi in the subsequent phase (Fig. 9).

Over the past year, we have made 7 free transfers of inguinal flaps, thereof 3 in children under the age of 10. Healing in all the cases was free from complications.

In the wide range of free flaps, the inguinal flap continues to be used for a number of localizations, particularly in cases requiring a large amount of the skin and subcutis. The limiting factors in some cases are the small length of the vascular pedicle and, sometimes, different skin coloration. But as the withdrawal is free from consequences and the scar following withdrawal is little conspicuous, the inguinal flap is well suited for operations on women and children.

SUMMARY

Clinical cases are presented to exemplify the uses of the free inguinal flap in different localizations. A singletime operation involves the transfer of large segments of the skin and subcutis to the site requiring reconstruction, thus substantially reducing treatment time; there is a minimum of secondary scarring.

RESUME

Lobe libre inguinal et son emploi

Tvrdek, M.

Sur les cas cliniques, on démontre les exemples d'utilisation du lobe libre inguinal, dans diverses localisations. Au cours d'une seule opération, d'assez grands segments cutanés, avec des couches souscutanées, sont transmis aux endroits de nécessité ce qui réduit considérablement la durée du traitement. La cicatrisation secondaire est minimale.

ZUSAMMENFASSUNG

Ein freier Lappen der Leistengegend und seine Ausnutzung

Tvrdek, M.

An Hand klinischer Fälle werden Beispiele der Ausnutzung eines freien Lappens der Leistengegend in verschiedenen Lokalisierungen angeführt. Im Verlauf einer Operation werden grössere Hautstücke mit dem Unterhautzellgewebe an die benötigte Stelle übertragen, was die Dauer der Behandlung und der sekundären Vernarbung erheblich verkürzt, und die sekundären Narben sind minimal.

RESUMEN

El lóbulo libre inguinal y su empleo

Tvrdek, M.

En diferentes casos clínicos se conocen ejemplos del empleo del lóbulo libre inguinal en diferentes lugares. Durante la acción de la operación, se transplantan hacia los lugares necesarios pedazos mayores de piel con tejido subcutáneo, lo cual reduce sustancialmente el período de tratamiento así como minimiza las cicatrices secundarias.

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EXPERIENCE IN PLASTIC OPERATIONS ON SACROCOCCYGEAL TERATOMAS IN CHILDREN

V. A. Bushmelev, N. A. Ovetchkina

In surgical operations on congenital sacrococcygeal teratomas we observe a considerable defect of soft tissues in the overexpanded floor of the pelvis and excess of skin covering the tumour. The classical method of operation described in handbooks of pediatric surgery envisages a bow-shaped incision of the skin over the malformation so that its ends reach up to the greater trochanters while the middle of the bow is situated behind the anus (Fig. 1). After enucleation of the tumour, an attempt is made to contract the floor of the pelvis, to excise the excess of skin and to put in stitches along the operation wound. The transversal suture or the suture in the form of a gently sloping bow produced in this manner does not correspond to the conditions of optimum healing of the wound, does not promote normal shaping of the configuration of the buttocks and frequently hampers it due to the formation of coarse post-operative scars.

To avoid these shortcomings, our department developed operative approaches to the removal of presacral tumours in dependence on their size, and methods of plastic reduction of skin, concentrated on improvement of the cosmetic result of operation.

MATERIAL AND METHODS

During a 15-year period, 31 patients with sacrococcygeal teratomas, aged 3 days to 8 months, were operated in our Department. They comprised 7 boys and 24 girls thus confirming the data of plentiful literature on the predominance of females in this pathological condition. From the clinical aspect, the localization of the tumour was external in 6 cases, internal in 4 cases and both external and internal in 22 cases including 8 in which the malformation was situated asymmetrically. According to morphological structure, it was possible to distinguish cystose tumours (in 7 patients), solid teratomas (in 13) and teratoids (in 11).

Removal of a presacral tumour is an atypical operation. Choice of the intervention depends on the age of the infants, the size, localization and symmetricalness of the malformation as also on the degree of its penetration into the depth of the pelvis

minor. When preparing for the operation, it is necessary to take into consideration its traumatism, possible blood loss and condition of the skin covering the malformation.

In 27 patients the operation was carried out in the planned routine. Pre-operative treatment of these patients included blood transfusions and hemostatic therapy. In four infants aged 3 days to 2 weeks, maceration and signs of inflammation of the skin above the tumour, attenuation of the membranes with threatening rupture of a cystose teratoma called for urgent operation with short pre-operative preparation lasting 1.5 to 2 days where antibiotics with detoxication-infusion therapy were indicated in addition to blood transfusion and hemostatics.

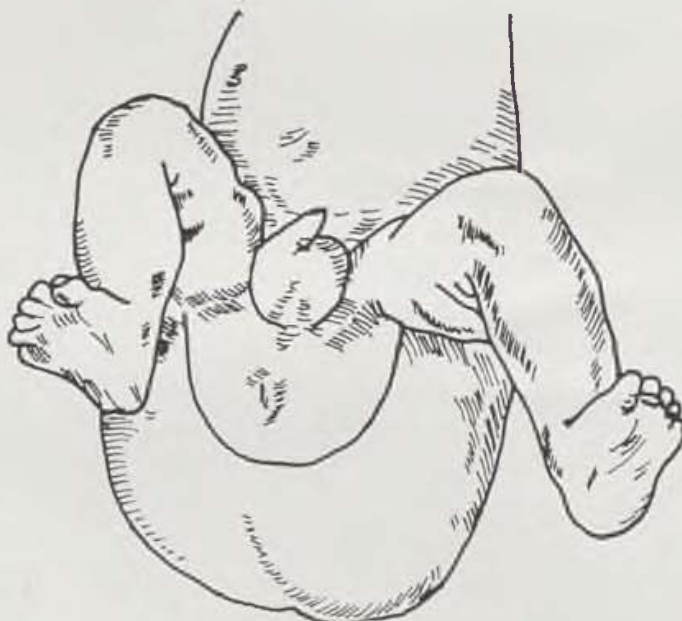


Fig. 1 Line of skin incision according to S. D. Ternovskii in surgical removal of sacro-coccygeal teratoma

Surgical intervention was carried out under endotracheal anaesthesia and protective drop infusion of fresh citrate blood. The classical method of operation envisages the position of the patient on his back with the pelvis elevated and abducted legs. We, however, place the patient on the operation table on his chest with the pelvis elevated and the legs abducted, a large pad supporting his abdomen. Such a position ensures the most suitable access to the whole space between the sacrum and the rectum.

Skin incision is performed individually depending on the size and localization of the tumour. When the tumour is large, i. e., when its outer diameter exceeds 12 cm, a cross-shaped incision of the skin is made with its intersection at the top of the tumour but with the distal end of the middle incision going not farther than 3 cm from the anus at a minimum (Fig. 2). When the tumour is smaller, the skin incision is made in the form of a triradiate star with its top in the midline 5—7 cm away from the anus. The incisions are limited by the base of tumour (Fig. 3). On this occasion, three skin flaps with obtuse angles at the point of intersection are produced.

When the tumour is localized asymmetrically, we shift the incision closer to the sagittal line, however, we observe the essential principle of cross-shaped or triradiate incision of the skin.

On using these types of incision where the skin flaps covering the outer portion of the malformation are separated successively, all stages of the operation are performed under visual control. Electrosurgery applied for the removal of the tumour reduces considerably blood loss, especially when mobilizing the rectum and the lateral sections of the malformation. The broad access makes an easy and atraumatic resection of the coccygeal vertebrae possible.

Many authors (I. A. Romanchuk, 1970; Vaez-Zadeh et al., 1972, and others) urgently recommended resection of the coccyx in all cases of surgical treatment of presacral teratomas. This approach not only facilitates further removal of the inner portion of the tumour but, what is the most important thing, it allows the operation to be performed more radically from the oncological point of view (F. G. Uglov and R. A. Mursalova, 1959).

After complete removal of the teratoma, having made surt about radicalness of the operation, hemostasis is started by electrocoagulation and suturing of bleeding portions of the tissue, followed by shaping of the deformed floor of the pelvis. Special attention should be paid to thorough reduction of the pelvic floor muscles overexpanded by the tumour, and to reconstruction of anatomically correct position of the dislocated rectum. While pulling up the lower skin flap, the anus is shifted into the rectal triangle so as to locate it not farther than 5 cm away from the coccygeal vertebrae. The elements of the rectococcygeus muscle are sutured together, thus maintaining the intestine in correct anatomical position. Its lateral surfaces are sutured to the fibres of the right and left



Fig. 2a, b Lines of skin incision and excision in sacrococcygeal teratoma
a — the first method of plastic surgery, b — plastic skin reduction

Fig. 3a



Fig. 3b



Fig. 3c



Fig. 3d



Fig. 3a, b, c, d Lines of skin incision and excision in sacrococcygeal teratoma
a — the second method of plastic surgery, b, d — lines of skin suture in plastic reduction, c — lines of skin incision and excision in case of small outer dimensions of the tumour

levatores and muscles. A system of drainage tubing is attached to the base of the wound to make possible subsequent suction of the wound secretion for 1.5—2 days.

Reduction of the skin wound is by no means a less responsible moment. Conversion of one configuration into another (convex into concave) on the basis of local redistribution of tissue is the main and most important aspect of this operation. The considerable excess of skin is folded in double and the bounds of excision are outlined. In the cross-shaped incisions, the line of excision is traced in the form of a rhombus following the ends of its diagonals (Fig. 2a). The excess skin is excised while the remaining skin is sutured together in sagittal direction (Fig. 2b).

In the triradiate incision, the excess skin is resected in the form of an equilateral triangle circumscribed around the triradiate star (Fig. 3a). The middle of the edges of the sides of the triangle thus formed are moved towards each other and sutured together in such a way that the centre of meeting of the flaps should be situated not less than 5 cm above the anus (Fig. 3b) (V. A. Bushmelev, 1982). When the outer dimensions of the tumour are small, only the lateral flaps are removed (Fig. 3c) and the lower flap is brought to the top of the angle. In this manner, the skin is reduced according to the triangular counter-flap type of plastic operation (Fig. 3d). When using the principle of local redistribution of tissues, many variants of resection and transfer of skin are possible, which is taken into account when the tumour is asymmetrical. Mathematical principles of planning based on the thesis of A. A. Limberg (1963) offer the possibility of easy translocation of skin flaps in the direction needed to achieve the desired form of the region operated on.

Plastic reduction of skin is carried out under moderate tension. This produces uniform pressure on the wound, promotes hemostasis, fills up the developed defect of soft tissues and leads to a favourable postoperative course. A deep fold is created between the buttocks, the configuration of the buttocks is preserved and this results in a good cosmetic effect.

RESULTS AND DISCUSSION

The proposed method of operation was used in 23 infants, the classical method in 8. Four of the patients operated in the clinic for sacrococcygeal teratomas died. Lethal outcome immediately after operation occurred in 2 infants operated in the newborn period because of urgent indications connected with complications of teratomas: one died from multiple developmental defects, the other from postoperative shock aggravated by bleeding from the bed of the tumour. The third infant (a 2-week-old premature girl) died 3 weeks after operation from suppuration of the postoperation wound, sepsis and destructive pneumonia. The fourth child, aged 1.5 years, died after repeated intervention because of the malformation becoming malignant, growing into the wall of the rectum and metastasizing in the brain and the lungs.

In this connection, the question arises concerning the terms of operation for sacrococcygeal teratomas. Clinical observations and literary data shows that surgical intervention should not be postponed until the age of 6 months as recommended in most manuals. With a view to the disposition of teratomas to malignant degeneration, the age of the child should not be the reason for delaying surgery. The operation should be performed in the early periods before complications and malignant degeneration occur (B. I. Verkhovskii, 1967;

V. V. Gavryushov and A. T. Dzhoyev, 1973; E. E. Loiko and K. A. Mogilevskaya, 1979; N. L. Kushch et al., 1984; Waldhausen et al., 1963; Tapper and Lack, 1983, and others). Timely operative treatment yields goods immediate and delayed results (Ein et al., 1980).

Delayed results could be studied in 26 operated patients in periods ranging from 6 months to 7 years. All the children are virtually healthy, they do not lag behind their contemporaries in physical development. In one child, stool incontinence was observed for a period of 4 months after release. Subsequently, the function was restored and the boy is developing quite satisfactorily. The cosmetic result after plastic reduction of the wound is good in all patients, a deep fold has developed between the buttocks, the configuration of the buttocks has been preserved.

CONCLUSIONS

1. The proposed surgical approaches to sacrococcygeal teratomas according to size make possible a broad and atraumatic access to the operative field on removing the tumour. In comparison with classical methods, plastic reduction of the skin after removal of the tumour leads to better functional and cosmetic results.

2. Plastic operations can be the method of choice for sacrococcygeal teratomas in patients of any age.

SUMMARY

Immediate and delayed results of 31 operations for the removal of sacrococcygeal malformations in infants in the first months of life are reported. In 23 patients, the author's own surgical method was used consisting in plastic constriction of the floor of the pelvis and reduction of the skin. Radical plastic operation carried out in the first weeks of the infant's life gives in all cases positive functional and cosmetic results.

RESUME

Expériences avec les opérations plastiques des tératomes sacrococcygiens chez les enfants

Buchmelev, V. A., Ovetchkina, N. P.

L'article donne les informations sur les résultats immédiats et ultérieurs obtenus lors de 31 opérations ayant comme but l'ablation de malformations sacrococcygiens des enfants dans les premiers mois de vie. Pour 23 cas, les auteurs ont adopté leur propre méthode, consistante en rétrécissement plastique du fond de bassin et en réduction du recouvrement dermal. Une opération radicale, exécutée dans les premières semaines de vie d'enfant, présente un bon résultat fonctionnel et cosmétique dans tous les cas.

ZUSAMMENFASSUNG

Die Erfahrung mit plastischen Operationen bei sakrococcygealen Teratomen bei Kindern

Buschmelew, W. A., Owetchkina, N. P.

Der Artikel informiert über die unmittelbaren und späteren Ergebnisse von 31 Operationen zur Beseitigung sacrococcygealer Missbildungen bei Kindern in den ersten Lebensmonaten. Bei 23 Patienten wendeten die Autoren ausgearbeitete Operationsmethoden an, die in einer plastischen Verengung des Beckenbodens und einer Reduktion der Hautdecken bestanden. Eine radikale plastische Operationen in den ersten Wochen des Lebens des Kindes hat in allen Fällen ein gutes funktionsgemässes und kosmetisches Ergebniss.

RESUMEN

Experiencia en operaciones plásticas de tumores sacrococcígeos en niños

Butchmelev, V. A., Ovechkina, N. P.

Este artículo suministra información sobre los resultados inmediatos y posteriores de 31 operaciones destinadas a rectificar malformaciones sacrococcígeas en niños de pocos meses de vida. En 23 de los enfermos se empleó el método desarrollado por los autores, que consiste en el estrechamiento plástico del fondo de la pedvis y en la reducción de los recubrimientos cutáneos. Mediante esta operación plástica radical, realizada en los primeros años de la vida del niño, se obtuvieron en todos los casos, buenos resultados desde el punto de vista funcional y cosmético.

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INITIAL PLASTY OF OPEN INJURIES OF WRIST AND FINGERS

V. S. Bondar, A. Zh. Abdrakhamonov

Open injuries of the wrist and fingers occur quite often and patient invalidity rates remain significant. Any progress in prevention and treatment of wrist trauma is highly significant both for patient and community, as about 70 per cent of open wrist and fingers injuries occur under manufacture conditions and most often in the young people [1].

Saving treatment principles, founded by N. I. Pirogov over 100 years ago have not become yet, to our regret, the prevailing method of open injuries of wrist and fingers treatment. The number of saving operations, carried out during the initial surgical treatment of wrist and fingers injuries is still quite low as it used to be. Unnecessary amputations have been still carried out quite often. I would like to remind of the felicitous rebuke of P. P. Vreden (1931):

"Primary amputation of fingers, considering their tremendous value, is always contraindicated. Everybody knows it very well, how each centimeter of upper limb is valuable, how important are even little remains of fingers... spect of contemporary surgery, caused by ideas remote from science."

Amongst various fashions of open injuries of wrist and fingers initial plasty we take Italian principle for the most simple and reasonable. The above method inheres unlimited possibilities to carry out initial plasty of wrist and fingers wound defects, as the skin flap is usually excised on front abdominal wall, the bed of which can be easily sutured with local tissues without expressed intention; furthermore the forced hand position is relatively "comfortable".

Essential failure of Italian method of plasty is the open wound left under feeding pedicle of skin flap, being the source of infection and maceration.

METHODS

Major clinical feature of wrist defects plasty is that it is carried out in compliance with the principle of hastened pedicle flap plasty and to perform it we do not have to resurface the whole tube flap but merely the base of feeding pedicle, as the

excised skin flap is immediately sutured on wound defect of the wrist. We have conducted the covering wound surface of feeding pedicle in various modes (Fig. 1), but most often with lateral triangular flaps, excised at the base of skin flap.

Having resurfaced feeding pedicle, we remove the essential failure of Italian plasty — the wound under the feeding pedicle of the excised skin flap.

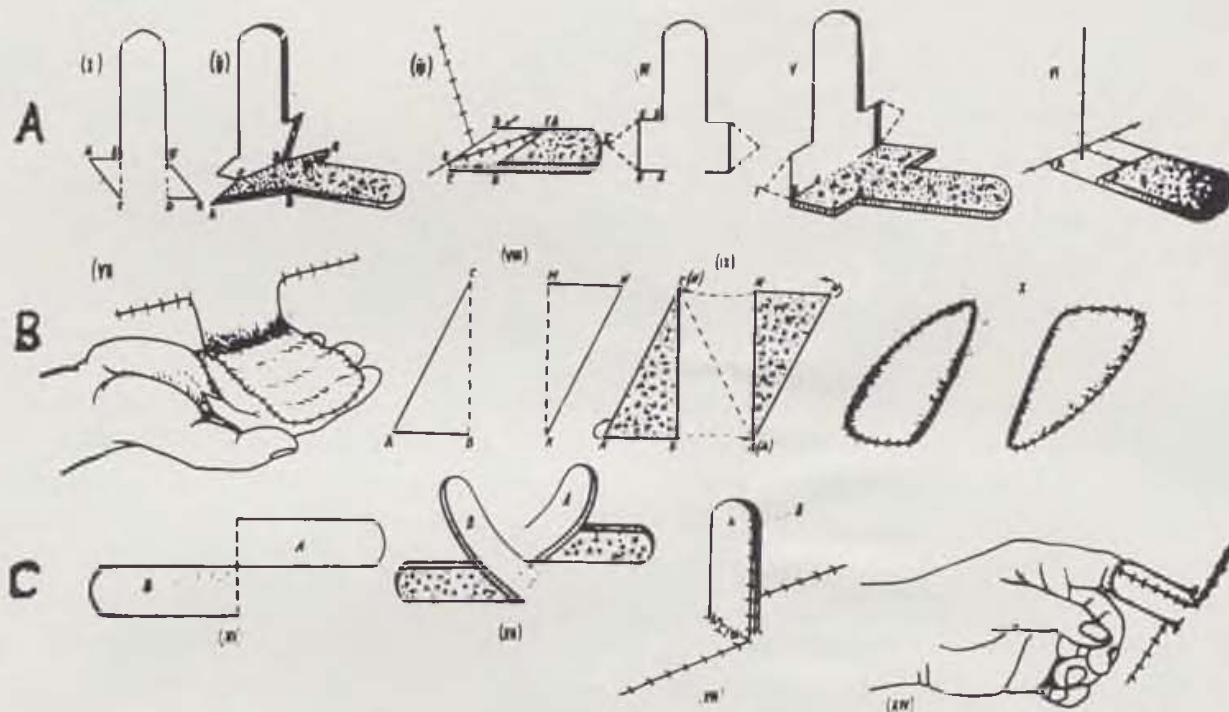


Fig. 1 Plasty schemes in wrist and fingers injuries

A — forming Italian flap and wound surface of feeding pedicle cover with lateral flaps, B — forming rombic flap tube transplant
C — forming doubled flat tube flaps

Having sutured the tube flap on treated defect of wrist we have covered all the wound, feeding pedicle is not extended and good transplant take is usually starting (Fig. 2). The inset of this kind of tube flap, harvested from the front abdominal wall enables to keep upper limb in comfortable position and is indicated in case of stripped tendons, bones and joints incidence (Fig. 3).

The practice revealed: no matter how qualified the restoring operation of the bones, tendons or bone joints, positive outcome of plasty cannot be expected, unless appropriate resurfacing is accomplished and healing of wound defect is obtained due to secondary extending. The full resurfacing is highly significant in open injuries of wrist and fingers treatment both for successful plasty of wound defect and successful reconstructive operation later on.

Our modification of open injuries of wrist and fingers Italian plasty enables to join the initial surgical treatment with initial plasty and to carry out osteotomy with Kirchner pins applying primary tendon suture. This mode of primary plasty enables the surgeon to excise merely necessary traumatized tissues, unless the stump is cut short, the fact very important to reduce patient invalidity degree (Fig. 4). The special

surgical assistance extent is terminated by this plasty in incidence of relatively un-serious wrist and fingers injuries (Fig. 5).

Initial skin plasty of open wrist and fingers injuries by hastened flat tube transplant, harvested on the front abdominal wall was applied when treating 94 patients



Fig. 2a, b Resurfaced pedicle of Italian flap being sutured to the dorsal surface of the left wrist (a) and the same pedicle 20 days later (b)

(67 males and 27 females in the age from 5 up to 55 years). Individual injuries of fingers occurred in 40 patients, multiple ones in 37. 8 patients had injuries on palmar wrist surface, 6 patients had undergone full amputation of all the fingers of wrist with major defects of skin cover; we have carried out tube plasty in 3 children to treat scarring contractures. The initial surgical treatment of the injuries was terminated by initial skin plasty of wound defect with tube flap in 91 patients, carried out from 2 up to 8 hours after exposure.

Traumas observed were mostly of manufacture character and happened during the work on planers, presses, frame saws and other machines.

RESULTS AND DISCUSSION

According to clinical observation the take of full-thickness skin flap on feeding pedicle with thin layer of subcutaneous fed tissue is not dependent on recipient sound condition to the certain degree and makes thus an important factor of additional feeding of trophical changed tissues. The take of above flap process prevents inflammation and necrosis (Fig. 6), forming slowly healing scarring wounds and contractures. It reduces the time of necessary treatment. Mean length of observed patients treatment represented 32 ± 5 days.

The upper limb is usually fixed in forced position with gauze tube and when the take of the flap is good we discharge patient frequently home and hospitalize him for the second time on the 28th or 30th day to cut off the feeding pedicle of skin flap and to terminate the plasty.

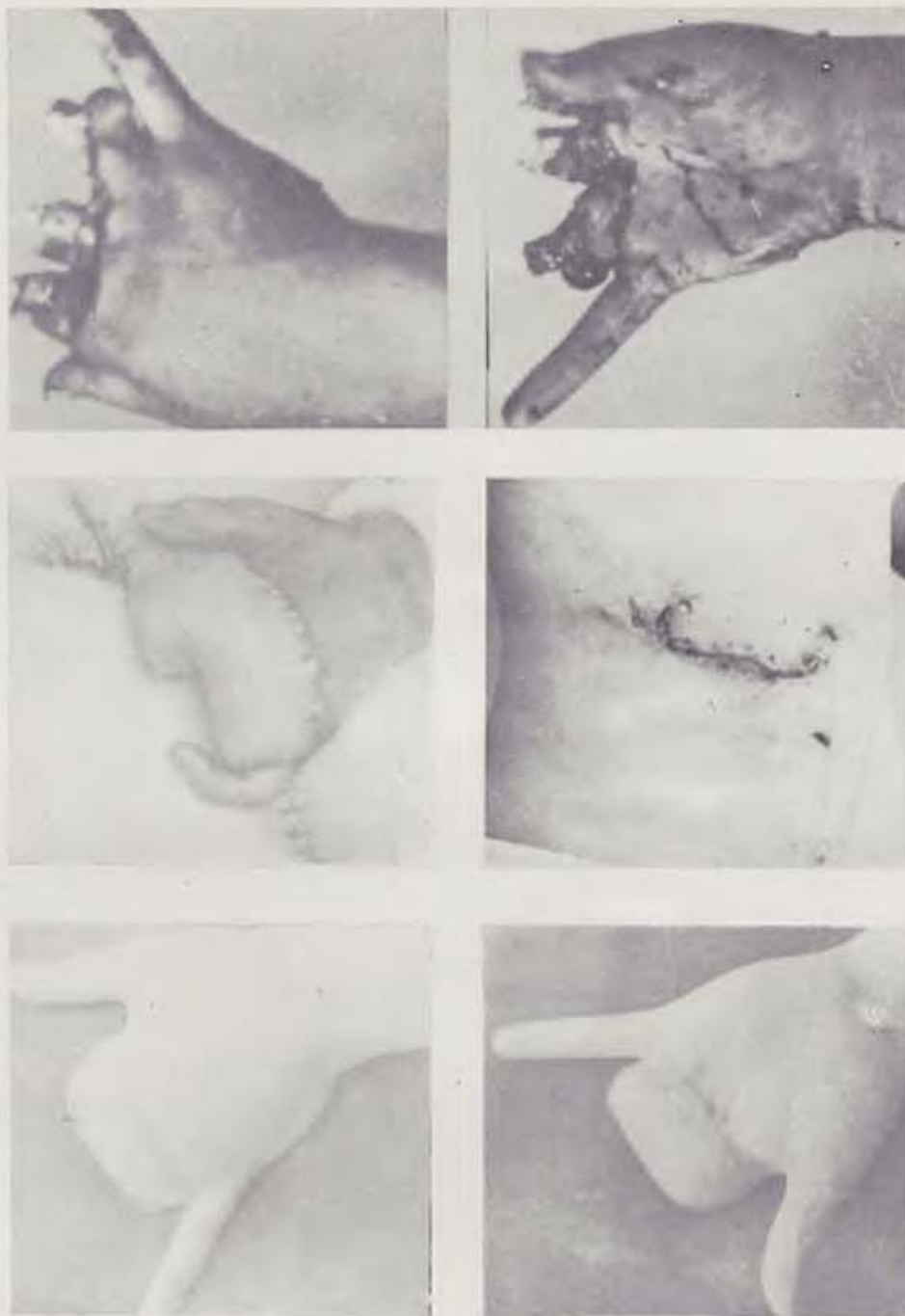


Fig. 3a, b, c, d, e, f Traumatic amputation of the left wrist fingers (a, b). Skin flap sutured to the left wrist stump (c) and skin scar on front abdominal wall after flap raising (d). Taken flap on the stump of left wrist (e, f)

Clinical observations also reveal, the careful removal of scarring tissues on wrist and fingers, immobilization accompanied by simultaneous plasty of wound defect by full thickness flap represent frequently all the necessary assistance to the patient (Fig. 7).

The skin flaps sutured on wound defects took well in the observed cases, and just corrective operations were carried out in 16 patients, mostly to reduce the taken flap thickness.

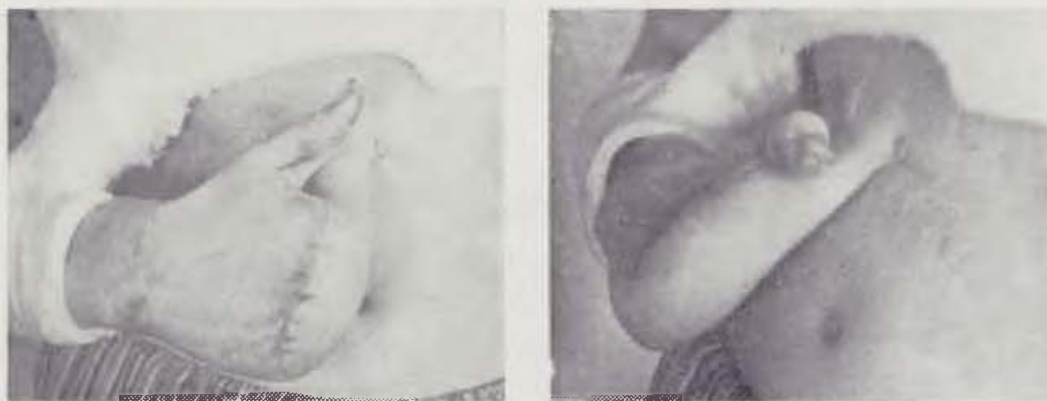


Fig. 4a, b Another mode of skin flap suture to the right wrist stump, when carrying out the primary plasty

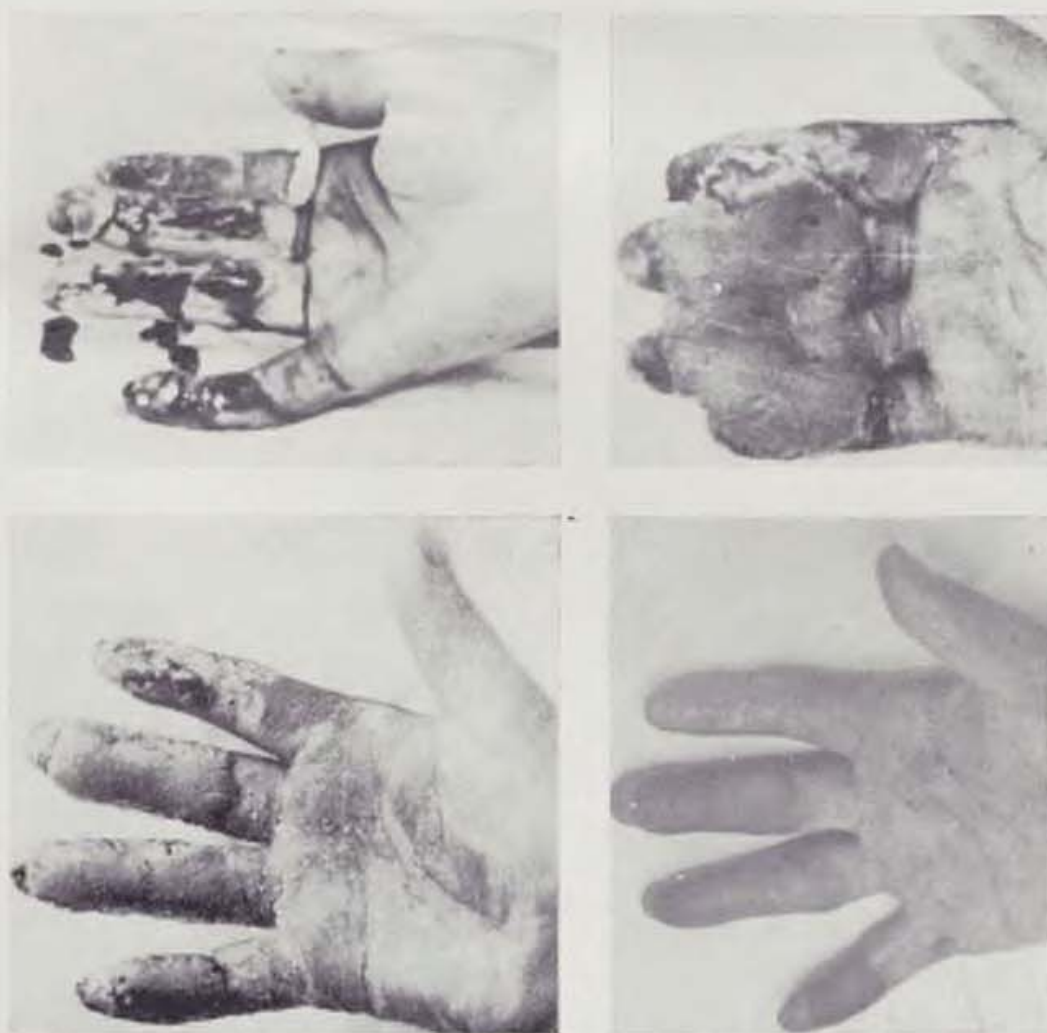


Fig. 5a, b, c, d Simultaneous primary plasty of the stripped wounds of index, middle and little finger of the right hand



Fig. 6a, b Necrotic wound with the stripped ungual and middle phalanx of the index finger of the left hand (a) and the skin flap taken on the wound (b)

Considering the unique reconstructive operations being carried out on wrist and fingers lately, initial plasty of wound defect applying full-thickness skin flap, while stripped fragments of stump are not cut short, is facilitating later reconstructive and restorative operations. This strategy of providing necessary help to patient with wrist and fingers trauma must become generally applied.



Fig. 7a, b, c Removing postburn flexion contracture of the middle, ring and little finger of the right hand. Tube flap sutured to the wound defect (a), taken tube flap after cutting feeding pedicle off (b). Wrist aspect after corrective plasty (c)

CONCLUSION

Primary plasty of open injuries of wrist and fingers applying transplant with covered feeding pedicle provides good take of transplant and is also consistent with functional demand to restore skin cover on supportive and working surfaces of body. The above plasty carried out in accord with described methodology is recommended as organ saving operation.

The principle of full resurfacing working surface of wrist is indicated when treating postburn and Dupuytren contractures, in case of inborn wrist deformities plasty, when treating stripped wounds and radiation ulcers.

Italian principle of plasty modified in our methodology may complement reconstructive repertoire of skin plasty and rehabilitative therapy in patients with wrist and fingers injuries.

SUMMARY

Improved Italian fashion of primary plasty of open wrist and fingers injuries is described, adding wound surface of feeding pedicle cover with lateral triangular skin flaps. Clinical experience is analyzed of treating 94 patients (67 males, 27 females) in the age from 5 up to 55 years.

Initial skin plasty of open wrist and fingers injuries is viewed as organ saving operation, reducing the invalidity degree of patients.

RESUME

Plastie de premier plan des traumatismes ouverts du poignet et des doigts

Bondar, V. S., Abdrakhmanov, A. Z.

On décrit un perfectionnement de la méthode italienne des plasties de premier plan des traumatismes ouverts du poignet et des doigts. Le procédé est caractérisé par le recouvrement de la surface lésionnelle de la plaie d'un pédicule artériel par des greffes cutanées latérales, en forme de triangle. On analyse les expériences cliniques obtenues par le traitement de 94 malades (67 hommes et 27 femmes), à l'âge de 5 à 55 ans.

La plastie cutanée de premier plan des traumatismes ouverts du poignet et des doigts est envisagée comme intervention destinée à conserver l'organe et à minimiser le degré d'invalidité des atteints.

ZUSAMMENFASSUNG

Die anfängliche Plastik bei offenen Verwendungen des Handgelenks und der Finger

Bondar, V. S., Abdrakhmanov, A. Z.

Es wird die vervollkommnete italienische Methode einer anfänglichen Plastik offener Verwendungen des Handgelenks und der Finger beschrieben, bei der die Oberfläche der Wunde der Gefäßwurzel der Transplantate mit seitlichen dreieckigen Hauttransplantaten verdeckt wird. Es wird eine Analyse der klinischen Erfahrungen mit der Behandlung von 94 Patienten (67 Männern und 27 Frauen) im Alter von 5—55 Jahren angeführt.

Die anfängliche Hautplastik offeren Verwundungen des Handgelenks und der Finger wird als eine Operation verstanden, die zur Erhaltung eines Organs dient und die Stufe der Invalidität der Betroffenen vermindert.

RESUMEN

Plástica inicial en heridas abiertas de muñecas y dedos

Bondar, V. S., Abdraimanov, A. Z.

Se describe el método italiano mejorado para la plástica inicial en heridas abiertas de muñecas y dedos, mediante el cual la superficie de la herida con raíz vascular transplantada, se recubre mediante trasplantes cutáneos laterales de forma triangular. Se presenta el análisis de las experiencias clínicas en el tratamiento de 94 enfermos (87 hombres y 27 mujeres) en edades entre 5 y 55 años.

La plástica inicial cutánea en heridas abiertas de muñecas y dedos está comprendida como una operación que se utiliza para el mantenimiento del órgano y disminuye el grado de invalidez de los afectados.

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CO₂ LASER SCALPEL IN CLINICAL PRACTICE. CASE REPORTS

V. Sekan, F. Mariš, Š. Zboja, V. Gaalová

The surgical laser device Scalpel-1 is designed for various types of surgical operations on soft tissues performed in conventional operating theatres using focussed or unfocussed beam of continual CO₂ laser.

Scalpel-1 permits to perform surgical operations under haemostatic and septic conditions. It is used for operations on the alimentary tract, for skin plastic operations, for gynaecological surgery, for the treatment of suppurative and infected wounds, burns, decubitus ulcers, haemangiomas, etc. (Fig. 1).

Scalpel-1 is designed for use in atmospheres prevailing in normal temperate zone conditions. It is equipped with a system for the disposal of products arising from the interaction of laser radiation and biological tissues.

Technical specifications

Maximum electric power demand is 1.4 kW, weight — 225 kg.

The luminiferous part permits free movement of the output endpiece in six degrees of freedom in a working zone of 200 by 500 by 200 mm using a maximum force of 300 g. The smoke exhaustor is activated automatically on pressing the switch-on pedal of the apparatus. Unless there is water in the cooling system, a blocking device will automatically disconnect Scalpel-1 from the mains.

The laser beam wavelength is 10.6 μ m, the radiation output at the tip of the luminiferous part is a minimum of 20 W.

Scalpel-1 makes use of the principle of the effect on biological tissues of continual laser radiation on 10.6 μ m wavelength. This permits the making of bloodless incisions on the patient's internal organs and body surface.

There are two techniques to achieve this:

- a) using precisely focussed laser beams,
- b) using a metal cutting instrument and photocoagulation of the incision walls with an unfocussed beam.

The output performance is regulated with a diaphragm showing the percentage of the energy let through.

After some preliminary testing trial operation on pigs and rabbits we used the Soviet-made Scalpel-1 surgical laser device for actual clinical purposes.



Fig. 1 CO₂ laser scalpel — Scalpel-1

Case reports

We wish to report on two female patients operated on with CO₂ laser for neoplastic skin processes.

Patient A. M., clin. notes No. 23276, was admitted at the Department of Plastic Surgery, Bratislava, with the diagnosis of: basalioma reg. frontotemporalis l. dx. recid.

Before being admitted to our Department, this 72-year old woman with a two-year history of tumour in the right-hand frontotemporal region, had had three operations at her local district surgical unit, last time in January 1983 when histological tests corroborated the diagnosis of metatypical basalioma.



Fig. 2 Basalioma 7 by 4 by 2 cm in size. Pre-operative state



Fig. 3 Transplant healed in, and growing granulations

In the right frontotemporal region we found a tumour, 7 by 4 cm in size, elevated 2 cm above the neighbourhood. It was fixed to the base, the respective lymph nodes were unenlarged.

The patient was operated on in April 1983. The tumour was excised with an CO₂ laser scalpel in local anaesthesia. A defect 12 by 8 cm in size was produced. As the tumour had grown as far as the periosteum, we removed also the periosteum from an area of 4 by 3 cm. At its site we made several drill-holes in the lamina externa to facilitate the growth of granulations.



Fig. 4 CO₂ laser incision

The whole of the defect was covered with a free skin transplant taken from the thigh. The transplant attached to a responsive bed healed in without complications in 10 days (Fig. 3). The remaining defect (at the site of the removed periosteum) was also covered with a free skin transplant at a second operation to produce good union.

It took a whole month to prepare a suitable bed for the second operation, which we regard as an adequate period of time considering the patient's general conditions (ischaemic heart disease — subcompensated, hypertensive disease — WHO 2nd stage, poorly defined nephropathy, chron. uroinfection).

Histological test No. 281351. The material submitted for the test showed an undifferentiated invasive carcinoma reaching as far as the actual edge of the excision.



Fig. 5 Defect after laser incision

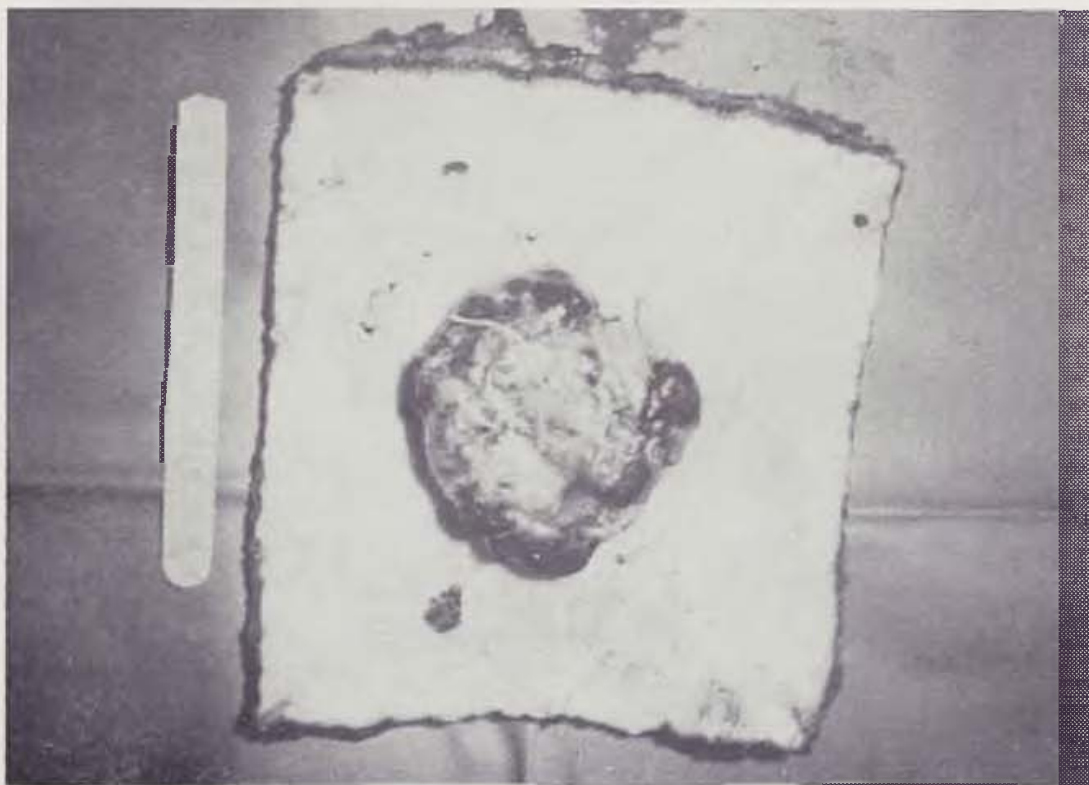


Fig. 6 Preparation as a whole



Fig. 7 Marginal defects of transplants — Fig. 8 Incision with a conventional scalpel in patient B. K. Epidermis, as well as deeper tissues, unaltered up to the edge of the incision

The laser effects were like those of a burn — loss of epidermis, connective tissue homogenization with strong eosinophilia, loss of connective tissue cells or (in the adnexa) their flattening and stretching.

Patient B. K., clin. n. No. 23279, was admitted at the Department of Plastic Surgery in Bratislava with the diagnosis of: nodular type of malignant melanoma on the back.

This 51-year old patient reported to have had a birthmark on her back from childhood. Starting in 1978 she began to observe its growth. But she did not seek medical advice until May 1982. By that time the tumour had grown the size of a large coin, itching and subsequently falling off. Owing to her husband's serious illness, she refused being operated on. After his death in April 1983, she was operated on at our clinical unit with a CO₂ laser scalpel.

On the dorsal side of the subscapular region there was a tumour 9 by 9 cm in size, the shape of a cauliflower, rising about 6 cm above the neighbouring surface, with dark-blue or black tumour formations that could just be seen through in the surrounding area (Fig. 4).

The only noteworthy medical features were hypertension 2nd stage WHO and considerable obesity.

We operated on the patient in April 1983, excising the tumour with a CO₂ laser scalpel in general anaesthesia. The size of the excision was 25 by 30 cm going as deep as the muscle fascia. As a primary measure we covered the defect with a free skin transplant (Fig. 5—7). Marginal defects (between the transplants and the edge of the excision) arising in the course of the healing process were 1 to 2 cm wide and subsequently healed per secundam. Owing



Fig. 9 Incision with CO₂ laser scalpel in patient B. K. Epidermis showing signs of burn up to 0.4 mm from incision. An 0.4 mm wide zone of coagulated connective tissue in the top part

to her considerable obesity the patient could not bear the permanent prone position with the result that the transplant zones exposed to tension were becoming detached for lack of contact with the base. Revascularization from the edges was out of the question as these were made up of a 3 cm thick layer of fat exposed to laser radiation for too long a time. Owing to the great depth of the excision multiple laser incision had to be made on the same site. The transplants achieved union in two weeks, the marginal defects in 6 weeks.

Histological test No. 281505: nodular malignant melanoma, 1.5 cm thick. Clark IV laser changes were the same as in the previous case. Epidermis was destroyed up to 1 mm from the edge, the connective tissue of the corium was burnt in a width of 0.2—0.4 mm.

During the operation period, both patients were provided with antibiotics, patient A. M. with ampicillin, patient B. K. with penicillin and streptomycin.

Scalpel-1 is powerful enough to achieve perfect hemostasis and sterility of the wound. In the other patient where a large area was planned for laser excision we could have used a greater-performance CO₂ laser, in which case the focussed-beam incision would not have been all that protracted and the destruction of the surrounding tissue need not have been quite so wide.

There was good revascularization of the transplant in relation to the recipient wound bed, and no haematoma developed.

DISCUSSION

Under optimum conditions, CO₂ laser incision will produce but a narrow edge of carbonization, zone of necrosis and zone of transient damage.

The focussed beam of laser radiation penetrates only as deep as the present radiation output will permit. The laser output and the power of penetration, i. e., the depth of incision, are in direct proportion. Since we have to do with contact-free incision, the depth of incision, especially a multiple one, is not identical. The use of greater-performance laser means a greater diameter of the focussed beam, so that the width of tissue damage increases also in direct proportion. The need to incise thicker layers of tissue of uniform histological structure leads to the cumulation of effect in the superficial layers as these are exposed to the effects of radiation even if the beam is accurately focussed. This accounts for the fact that changes in tissues of homogenous structure resulting from this kind of incision are differently wide at different sites. In tissues of heterogenous structure, the depth of penetration and the effect of laser beam energy depend on the histological structure, water, connective-tissue, pigment contents), and are likewise variable. Consequently, without the use of underlying metal plates any protection of the deeper structures and incised edges would be unthinkable.

Another important question is that of laser coagulation. Coagulation is possible with focussed as well as unfocussed beams. In either case, however, we have to count with more thermal changes in the tissue surrounding the coagulated vessel. Vessels of the dermis are the most likely to bleed, and the energy necessary for skin incision, especially on the back, must be greater than that needed for subcutaneous tissues incision.

The scar resulting from laser incision is about as strong as that produced by conventional scalpel incision. The aesthetic aspect of the problem certainly cannot be ignored, but here again scars resulting from laser incision are comparable with those resulting from conventional scalpel incision.

To conclude, we can say that a CO₂ laser scalpel offers several advantages in preparing the bed for the reception of the transplant, especially a split thickness graft transplant where the demands placed on the quality of the bed are not quite so great as in the case of full-thickness transplants. Good haemostasis and closure of lymphatic vessels reduce the risk of the transplant becoming detached from the bed owing to bleeding and fluid escape. Laser excision in itself sterilizes the bed, which is a great advantage, mainly in bedsores and burns, thus speeding up the possibility of covering the infected areas with free skin transplants.

CONCLUSION

The use of CO₂ laser in oncosurgery is justified and offers some advantages (wound sterility, no haematoma or seroma). The moot point remains if, in fact, the effect of laser radiation on blood and lymphatic vessels does reduce the risk of metastases spreading along those routes. For major operations, devices of 80—100 W in output are indispensable.

SUMMARY

Scalpel-1, a surgical laser instrument, is designed for diverse surgical operations on soft tissues performed in ordinary surgical theatres.

The laser scalpel optics permit working in two modes:

- using a focussed laser beam,
- using a diffuse or unfocussed laser beam.

The advantages of laser incision such as sterility, closure of smaller arteries, veins and lymphatic vessels, provide favourable conditions for having the transplant healed to the wound bed prepared with the use of the laser scalpel.

RESUME

CO₂ laser-bistouri dans la pratique chirurgicale.

A propos des cas cliniques

Sekan, V., Mariš, F., Zboja, Š., Gaalová, V.

L'appareil chirurgical de laser, Bistouri 1, est destiné aux exécutions de diverses opérations chirurgicales sur les tissus moux, dans des salles d'opération habituelles.

L'appareil optique du bistouri-laser permet choisir une de deux modalités:

- travail avec le rayonnement de laser focalisé,
- travail avec le rayonnement de laser disséminé ou non focalisé.

Les avantages de l'incision de laser comme stérilité, fermeture de petites artères, des veines et des vaisseaux lymphatiques, créent les conditions favorables à la prise des greffes sur les zones receveuses, qui ont été préparées par un bistouri-laser.

ZUSAMMENFASSUNG

Das CO₂-Laser-Skalpell in der klinischen Praxis. Kasuistik

Sekan, V., Mariš, F., Zboja, Š., Gaalová, V.

Das medizinische chirurgische Lasergerät, das Skalpell 1, ist zur Ausführung chirurgischer Operationen verschiedener Art an weichen Geweben in normalen Operationsräumen bestimmt.

Die Optik des Laser-Skalpells gestattet es, in zweierlei Weise zu arbeiten:

- mit fokussiertem Laserstrahl,
- mit divergiertem oder nichtfokussiertem Laserstrahl.

Die Vorteile der Laser-Inzision, wie die Sterilität, der Verschluss kleiner Arterien, Venen und lymphatischer Gefäße, schaffen geeignete Bedingungen für das Anheilen des Transplantats an das Bett, das mit dem Laser-Skalpell hergerichtet wurde.

RESUMEN

El escalpelo CO₂-láser en la práctica clínica. Casuística

Sekan, V., Mariš, F., Zboja, Š., Gaalová, V.

El equipo médico para cirugía a rayos láser — Skalpel 1 — está destinado para efectuar operaciones quirúrgicas de distinto tipo en tejidos blandos, en cuadros de operación ordinarios.

La óptica del escalpelo de láser posibilita la realización de operaciones de dos modos diferentes:

- mediante rayos láser enfocados,
- mediante rayos láser difusos o no enfocados.

Las ventajas de la incisión con láser en casos tales como esterilidad, cerramiento de arterias pequeñas, venas y vasos linfáticos, crean las condiciones propicias para la cicatrización de los trasplantes en la zona receptora preparada por el escalpelo a láser.

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REVIEW

Š. Šimko et al.: **The Treatment of Burned Patient's**. Publishers: Osveta, Martin, 1985.

The founder and head of the burns unit at Košice with a team of his co-workers have written a much needed and useful book on the treatment of burned patients. The publication gives a summary of the surgical and nursing techniques for the treatment of what is the severest injury of human traumatology using their own experience of many years compared with the latest views expounded in world literature. The general part presents the history of burns treatment, the effects of heat on the skin, severity rating and pathophysiology of thermal injuries. The special

part discusses in detail routine small to medium extent burns and the strategy and tactics of the treatment and cure of burn. The final chapters deal with the psychological problems of treatment as well as the health workers' reactions and their professional deformations. In conclusion, the authors discuss the organization of treatment for burns in cases of their mass incidence. Although the publication is intended for nurses, it is also a useful source of advice for physicians and surgeons of all specializations as required by team work with the burned.

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L. Šimun: **Surgery of Soft Facial Tissues**. Publishers: Osveta, Martin, 1985.

Following the success of his Atlas of the Surgery of the Hand of 1980, now a useful handbook to all engaged in the surgery of the hand, the author, himself an experienced plastic surgeon, has now come forward with a very welcome publication on the treatment of facial injuries. His book is an easy-to-survey comprehensive summary of all the problems involved, ranging from the anatomy of soft tissues,

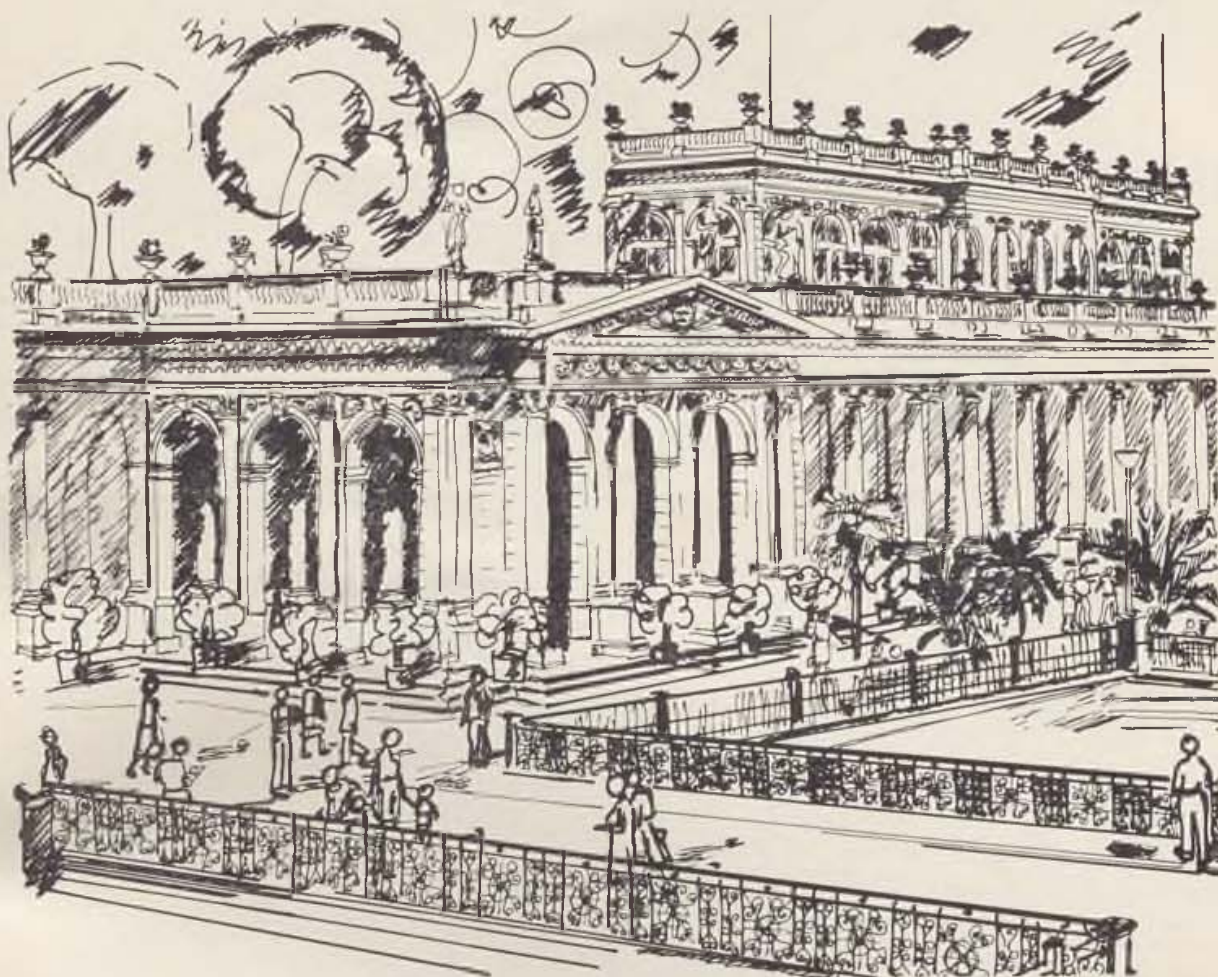
characteristics of wounds, biology of healing, surgical instrumentation, principles and methods of surgical technique up to post-operative treatment. All those principles are succinctly and realistically illustrated with the author's own drawings, which makes the publication a very useful atlas to turn to for advice. The book is indispensable for all traumatologists.

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STOP FOR A MOMENT AND CONSIDER YOUR HEALTH



DAY AFTER DAY AND YEAR AFTER YEAR YOU ARE CONSTANTLY CHASING SOME AIM OR ANOTHER, YOU STRETCH THE MAINSPRING OF YOUR HEALTH TO THE VERY MAXIMUM. AND HOW LONG DO YOU THINK YOU CAN CONTINUE TO DO SO? REMEMBER THAT YOU HAVE ONLY ONE HEALTH AND FINALLY MAKE UP YOUR MIND TO GRANT IT, AT A VERY REASONABLE PRICE, WHAT IT DESERVES: COMPLEX TREATMENT AT ONE OF THE OLDEST AND THE MOST WIDELY RECOGNIZED SPAS IN EUROPE.

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