

# CONTRIBUTIONS TO THE DERMATOGLYPHIC DIAGNOSIS OF HYPOSPADIAS

ANA ȚARCĂ<sup>1</sup> and ELENA TULUC<sup>2</sup>

The present study is devoted to palmar dermatoglyphics recorded on a batch of 51 boys affected by hypospadias, with ages between 2 and 16 years, all coming from Moldova. The group includes multiple anatomo-pathological forms of hypospadias, covering almost the whole existing range. The observation to be made is that, regardless of the anatomo-pathological forms in which the malady is manifested, the patients show, at the level of the dermatoglyphic picture of the palm, 10 important distortions or anomalies, bearing deep clinical implications, the frequency of which reaches – at the level of batch – values sensibly different from those of the reference batch from Moldova, being, however, quite close to those recorded in other congenital and hereditary affections taken into study from the same perspective. To these distortions, registered at the level of the 5 palm compartments, one should add other two, of general nature, referring to the positioning of the Th/I area on the last place in the classical formula of distribution in the frequency of the real patterns, instead of the last-but-one position, and of the Hypothenar, respectively, on position 2 instead of 3, in the same formula. The ample pathological charge of the palm picture of the affected people is nevertheless suggestively illustrated, as well, by the much increased occurrence of cases in which most of the distortions are present on both palms of the carriers, as well as of those with an exclusive disposition on one or another of the two hands.

Even if the results of the present study are the first, at national level, from a dermatoglyphic perspective, they might be used – until the investigations will be extended on larger batches – as reference data in the screening methods for a precocious tracing of the malady at populational level, at least in the region of Moldova, from which the patients come, if considering the immutable character of such morphological peculiarities along the whole life of an individual.

*Key words:* dermatoglyphics, pathology, distortions or anomalies, hypospadias.

## 1. INTRODUCTION

Known as a serious malady as early as the I<sup>st</sup> and II<sup>nd</sup> centuries *B.C.*, hypospadias is defined now – in the light of the recent investigations performed in the field – as a congenital malformation involving an abnormal opening of urethra's meat, on the ventral part of the penis, in the vicinity of its top, in any position from gland up to scrot, even in the perineum [6, 13]. Such affection may occur in multiple anatomo-pathological forms, depending on the level at which the meat is opening (in glandular, subcoronal, anterior, medium or posterior penian, vulviform, scrotal or penoscrotal, etc.). On the average, hypospadias records a frequency of 8.2‰, yet most of them (7.1‰) are less severe forms, which may be

solved by surgery. More grave are considered the cases in which the meat occurs at some distance from the top of the penis, which is usually associated with other complex malformations [2].

If considering the negative effects of such a malformation upon the superior urinary apparatus, upon sexual life which, sometimes, becomes impossible, upon the psychic development of the child, whose behaviour is usually affected, surgical remedies have been attempted at since quite a long time, yet positive effects came to be recorded only in the XIX<sup>th</sup> century.

The development of some performant micro-surgery devices, of the atraumatic suture fibers with delayed resorption as well as of new advanced techniques of anaesthesia and monitoring permitted the application of multiple surgical interventions, up to the re-shaping of the urethra – the so-called urethroplasty [3, 6, 7, 13, 14].

As to the **etiology** of the hypospadias, it is still incompletely elucidated [8]. Nevertheless, the studies of Bauer and coworkers (cited by Vasile D.V. 2002), performed on a group of 307 boys affected by it, shown that, in 21% of the cases, one other member of the family had been affected, 14% of them had at least one brother suffering from hypospadias, while in 7% of them – the father also had this affection. The results obtained permitted the conclusion that, among the factors involved in the installation of such a malady, heredity occupies a special position. It has been also established that, in a family without hypospadias antecedents but having a child affected by this malady, the risk of having one more child also affected is of 12%; when an uncle or a cousin of the affected child has this malady, too, the risk attains a value of 19% and, when the father is affected, the risk that another child should be also affected attains a value of 26%. In the etiopathogeny of hypospadias, however, there have been put into evidence – apart from the genetic compound – some other defects in the synthesis of testosterone, which stimulates the growth and development of the urethra and, implicitly, of the penis, and also the first delayed menarhe of the mother, her advanced age in the moment of birth, etc., all these factors causing an insufficient secretion of testosterone, with negative effects upon the development of the urethra.

Having all these considerations in view and on also considering that in the complex iconography of dermatoglyphics there may be most faithfully traced, besides the – normal and pathological – somatic, physiological and neuropsychic characteristics [1, 4, 12], the present study analyzes the patients suffering from hypospadias from this perspective, which is a premiere at national level. The authors thus attempt at evidencing the presence or absence of some malformative sketches bearing clinical significance, associated to this malady, which might serve as „markers” in screening at populational level [5, 12] permitting its prevention and prophylaxis.

## 2. MATERIALS AND METHOD

The dermatoglyphic investigations were performed on 51 boys suffering from hypospadias, with ages between 2 and 16 years, all coming from Moldova. 102 palmar and fingerprints were thus taken over at the “St. Mary” University Hospital of Iași, our partner since several years. Out of the 51 affected boys, 19 have anterior penian hypospadias, 11 – medium hypoaspadias, 9 – penobalanic hypospadias, 6 – posterior hypospadias, 3 – penoscrotal hypospadias, 1 – vulviform hypospadias, 1 – superior and 1 – galandular hypospadias, so that the batch under study covers almost the whole range of anatomo-pathological forms in which the malady is manifesting.

For all pathological indices (distortions or dermatoglyphic anomalies) put into evidence in the dermatoglyphic picture of the affected people’s palm – here considered for analysis – their bilateral differences, as well as their dispositions in the carriers (on either one palm or, simultaneously, on both of them) have been followed, as representing important aspects for a correct evaluation of the extent of batch’s affection, from a dermatoglyphic perspective. The results obtained were then compared with those registered on a reference group coming from the same region of the affected boys, namely Moldova [10].

The working methods applied are the classical ones, improved by the new procedures currently used in pathological populational dermatoglyphic investigations [4, 5, 9, 11, 12].

## 3. RESULTS

A first, general peculiarity, recorded at the level of the palmar picture, by which the series under study is deviating from normality (Table 1) refers to the modification of the classical succession of distribution in the frequency of the real patterns, in decreasing order of its value, namely  $IV > \mathbf{Hp} > III > II > \mathbf{Th/I}$  instead of  $IV > III > \mathbf{Hp} > \mathbf{Th/I} > II$ , the same succession being also evidenced in the mothers of the affected boys (to be approached in a further, separate study).

Special mention should be nevertheless made of the fact that, while positioning of the Hp areal on the second position in the formula had been reported, too, in many other congenital affections [4, 5, 12] while situation of the Th/I compartment on the last place had been noticed only in cardiovascular diseases (CVD), congenital heart malformation included, as well as in insulin-dependent diabetes (DZ<sub>1</sub>) and in the Down syndrome [1, 9, 11] which suggests possible severe medical involvements for the batch under study. More than that, the much more reduced pattern frequency in Th/I, of only 2.94%, led not only to changing the position of this palm area on the

last place, in the classical hierarchization, but also showed that it occurs under the minimum threshold of the normal variability scale in Romanians, and Europeans, as well (5–25%), which has been never evidenced, up to now, in studies of populational dermatoglyphy [1, 10, 12].

As to the distribution of the real patterns in the 5 palmar compartments, as a function of hand, also listed in Table 1, one may observe that the patients affected by hypospadias illustrate the classical tendency manifested in the reference batch (Hp, II, III:  $D > S$  and Th/I:  $S > D$ ), with the only exception of the interdigital space IV where, instead of patterns' prevalence on the left hand, *versus* the right one, equal values are to be registered on both hands (50.98%).

Table 1

Percent distribution of patterns in the 5 palm compartments of boys affected by hypospadias

Hand	Hp	Th/I	II	III	IV
L	29.41	3.92	5.88	15.68	50.98
R	37.25	1.96	7.84	33.33	50.98
L+R	33.33	2.94	6.86	24.51	50.98

However, apart from the general distortions present in the 5 palmar compartments of the affected boys, other 10 anomalies with clinical implications [1, 4, 5] have been evidenced, the mean percent values of which, recorded in the experimental batch, may be classified as:  $a-b > tt't'' > T_{11}+T_{12} > Cx > \text{dense network from Th/I} > Co > L^U > \text{Sulcus} > A^R = t_0$  (Table 2). The much higher frequencies – comparatively with the reference – in most of such distortions suggest that the causal factors involved in the installation of hypospadias have been manifested as early as the first 3–5 months of intrauterine life, when the papillary epidermal ridges had been also finalized.

At the level of the two hands, one may notice that distortions  $A^R$ ,  $tt't''$ ,  $t_0$ , the much reduced  $a-b$  distance and the palmar sulcus occur more frequently on the right hand, while  $T_{11}+T_{12}$ , the dense network of ridges in Th/I, Cx and Co, on the contrary, on the left one,  $L^U$  from Hp evidencing equal values on both hands (5.88%). The same bilateral tendency of the distribution of palmar distortions – obviously, with much lower values – may be also observed in the reference batch [10], although it had been signaled out in other congenital and hereditary maladies, as well [1, 4, 5, 9, 12]. From this point of view, deviation of the transverse palmar sulcus which, in both cases, is prevalent on the left and not on the right hand – which is the case of hypospadias – should be mentioned, as the authors of the present study met it only in patients with hypoacusy and congenital deafness [10].

The extent of batches' affections, from a dermatoglyphic perspective, is suggestively illustrated, too, be the manner in which the 10 distortions are arranged

Table 2

Percent distribution of palmar distortions in patients with hypospadias *versus* the reference

Palmar distortions	Hypospadias + reference	Left hand	Right hand	Total
A <sup>R</sup> in Hp	Hypospadias	1.96	3.92	2.94
	Reference	–	1.00	0.50
L <sup>U</sup> in Hp	Hypospadias	5.88	5.88	5.88
	Reference	1.00	2.00	1.50
tt't'', etc	Hypospadias	29.41	43.13	36.27
	Reference	9.00	15.00	12.00
t <sub>0</sub>	Hypospadias	1.96	3.92	2.94
	Reference	–	–	–
T <sub>11</sub> +T <sub>12</sub>	Hypospadias	39.21	29.41	34.13
	Reference	5.00	2.00	3.50
Dense and very dense network in Th/I	Hypospadias	19.60	15.68	17.65
	Reference	5.00	3.00	4.00
a–b distance < 24 mm of man	Hypospadias	64.70	78.43	72.55
	Reference	11.00	13.00	12.00
Cx	Hypospadias	35.29	25.49	30.39
	Reference	14.00	8.00	11.00
Co	Hypospadias	9.80	5.88	7.84
	Reference	3.00	2.00	2.50
The transvers palmar sulcus	Hypospadias	3.92	5.88	4.90
	Reference	3.00	1.00	2.00

in their carriers (on only one hand or bilaterally). In this respect, Table 3 evidences quite high frequencies for the simultaneous presence on both palms in 8 of the 10 distortions, which assumes a double pathological charge of the palmar picture of their carriers. From this perspective, the highest weight for the bimanual disposition is attained by the much reduced a–b distance 78.05%, followed by the transverse palmar sulcus (66.66), dense network of ridges in Th/I (63.63%) and finally, t<sub>0</sub>, recording a value of 50%, once known that it is extremely rare in all affections, being frequently absent in normal people [1, 4, 10, 11, 12, 14, 15]. The quite high percent values recorded, too, for the exclusive disposition on only one hand or another confirm the ample pathological charge of the palmar picture of the patients here under investigation. The fact that the palmar distortions analyzed have been also present in the palmar picture of the mothers of these children, in most cases in even higher ratios than in the affected boys, establishes also the pathognomic value of the dermatoglyphics and hence their possible utilization as a test in the prevention and prophylaxy of this malady, in consulting rooms for premarital genetic advice and family planning.

Table 3

Distributions of palmar distortions in their carriers, in hypospadias

Palmar distortions	Exclusively on the left palm	Exclusively on the right palm	On both palms	Total carriers
A <sup>R</sup> in Hp	1:3 = 33.33	2:3 = 66.66	–	3:51 = 5.88
L <sup>U</sup>	3:6 = 50.00	3:6 = 50.00	–	6:51 = 11.76
Tt't'' etc	3:25 = 12.00	10:25 = 40.00	12:25 = 48.00	25:51 = 49.02
t <sub>0</sub>	–	1:2 = 50.00	1:2 = 50.00	2:51 = 3.92
T <sub>11</sub> +T <sub>12</sub>	12:27 = 44.44	7:27 = 25.92	8:27 = 29.63	27:51 = 52.94
Dense network in Th/I	3:11 = 27.27	1:11 = 9.09	7:11 = 63.63	11:51 = 21.57
a-b<24 mm in boys	1:41 = 2.44	8:41 = 19.51	32:41 = 78.05	41:51 = 80.39
Cx	10:23 = 43.48	5:23 = 21.74	8:23 = 34.78	23:51 = 45.10
Co	3:6 = 50.00	1:6 = 16.66	2:6 = 33.33	6:51 = 11.76
Palmar sulcus	–	1:3 = 33.33	2:3 = 66.66	3:51 = 5.88

#### 4. CONCLUSIONS

Study of palmar dermatoglyphics in patients affected by hypospadias evidenced that, whichever the anatomo-pathological form of this malady, they show an ample pathological charge, suggestively illustrated by the 10 distortions or malformative sketches, the percent values of which, at batch level, exceed by for those recorded in the reference. This suggests that the causal factors responsible for the manifestation of the disease should be looked for in the first 3–5 months of intrauterine life, when the epidermal papillary ridges had been also established. To the 10 palmar distortions bearing deep clinical implications, part of them present on the left hand, part of them on the right one, those of general order, assuming important modifications in the frequency of the true patterns, in decreasing order of its value  $IV > \mathbf{Hp} > III > II > \mathbf{Th/I}$  instead of  $IV > III > \mathbf{Hp} > \mathbf{Th/I} > II$  in normal people, should be also added.

The ample pathological charge of the palmar picture of the patients suffering from hypospadias is suggestively illustrated, once more, by the much more numerous cases in which the anomalies evidenced are present on both palms of their carriers, yet without reflecting the still high frequency for an exclusive presence on one or another of the two hands. In spite of the fact that the present study is the first one performed – from this perspective – at national level, the results here evidenced might serve – until the development of new studies – as reference data in the screening of the malady at populational level, at least for Moldova, the region from which the patients come.

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<sup>1</sup>Iași Branch of the Romanian Academy,  
Department of Anthropology

<sup>2</sup>“Saint Mary” University Hospital of Pediatrics – Iași  
Corresponding author: antropologie.iasi@yahoo.com

