Filling the Gap: on the New Micro-toponomic Phenomena and Partial Topologies

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Abstract:
Topology is in a certain sense secondary if interpreted as a repercussion of internal status, that is, as a dynamic and static consequence, especially secondary to the other two types of surficial sciences: surficial osal anatomy and surficial muscular anatomy. The way the osal anatomy forms the muscular anatomy, both previous anatomies, form the third anatomy, the outer surficial anatomy of the body [2]. Topology dynamics is complex and multilayered, as it involves the at least two internal dynamics mentioned here, as well as their interaction. The paper deals with the systematic problems of surface anatomy, first of all, in relation to a certain number of external surficial phenomena, focusing boldly on folds, metacarpal, substernal and rectusal shallow systems.

Keywords:
Dynamics, Superficial Anatomy, Creases, Substernal Fossa, Rectusal Fossae, Micro-topology

1. Introduction

Surface anatomy is relatively young science, a science that has concentrated its research on the research of external anatomy of the bones, while in recent years also certain specific phenomena of surface anatomy, surface dynamics and surface anatomy of the skin, such as wrinkles and skin lines, are also somewhat more detailed in the relations between muscular landscapes and external, therefore non muscular, outward, surface anatomy [1]. Topology is in a certain sense secondary if it is interpreted as a repercussion of internal status, that is, as a dynamic and static consequence, especially secondary to the other two types of surfacial science, surficial osal anatomy and surficial muscular anatomy. The way the osal anatomy forms the muscular anatomy, both previous anatomies, form the third anatomy, the outer surficial anatomy of the body [2]. Topology dynamics is complex and multilayered, as it involves the at least two internal dynamics, mentioned here as well as their interaction. The dynamics of surficial topology is in itself the
most refined, and most complex in relation to its substructure, muscular, but not only muscular, dynamic, nature. To emphasize here only the facial anatomy, the most complex topology and the most complex dynamic interpretation of all given topologies. Surface anatomy should be approached as an autonomous complex, investigated independently, but also in the connection with previous topologies, as its active consequence. At this point, there is hardly any book or monographic publications on the anatomy, as understood here (as secondary surfi
cial structure), there is also no comprehensive systematization of all surficial phenomena, there is, what can be called, partial systematization, one can speak of topological partitions, such as facial topology [3], hand topology [4] as well as other possible topologies, however, there is always a lack of insight in the area of all partial topologies, in the case of hand topology, internal but not external. Then topography of rectus and substernum, as well as other topologies and dynamics, in order to form a complete, systematic topology. Special attention should be given to surface dynamics, which, unlike all other areas of research, is the most complex and demanding. Surface dynamics is an area that still needs to experience its ingenious flair.

Surface dynamics is still unexplored, and certainly must have its own framework, especially in the dynamics of complex structures. All muscles are shown as a very complex structure of surface repercussions, dynamism is often unpredictably. In complex structures we do not know the product in terms of interaction and great possibility of combinations. For this purpose author use here the term original dynamics, for example, the facial dynamics, but also of any other combined or interactive dynamics. The product of interactive dynamics is highly complex for one surfical typology, or typological classification. In terms of dynamism, there is no only one but an original anatomy (speaking primarily about active anatomy). Every anatomy is in a certain sense elusive, with regard to the interactive results. We do not yet know how much forms can encompass human face; human face is a reflection of the endless number of external forms; the face is a semi-perfect surface, almost perfect topology.

The facial dynamism, as one of the examples of dynamics (however, this problem is present in all other dynamisms) poses a great problem for science and the scientific method, first of all in relation to the professional nomenclature in the case of an assumed anatomy, since it is dynamic the product is always different, that is, the original dynamically interpretive anatomy.

We shall leave a dynamic structure aside, and deal with the systemic problems of surface anatomy, first of all, in relation to a certain number of external surfical phenomena. In a certain sense, surface topology has already been structured. Paper will try to fill some of the gaps in the nomenclature of surface anatomies, highlighting the work of certain researchers in this field and their contributions.

2. Materials and Methods

The field of research is the existing research results of surface anatomy, in its data, according to partial surface anatomies, or secondary partial topologies, as in the case of facial, manual or dynamic anatomy. The work use original contributions and nomenclatures [5][6] striving to emphasize and support the integrity of a formal scientific surficial system. The composition of the research is divided into three lines: i) the partial surface anatomy of the hand, ii) the structure of rectal anatomy and
the research experience of surface anatomy of the sternum, iii) and finally, to certain surface products, individual toponomies, which do not occur in a greater number of cases.

The researcher uses the observational technique of insight. Observation is realized on the existing number of research results in the area of surface anatomy. The work includes the results of palpable research, with the integrity of dynamic results. The observational method is used in correlation with the palpable method in order to establish interactions of primary and secondary superficial anatomy [7].

For example IFSSH [1] uses the following classification of the skin creases: The skin creases ("joints" of the digital and palmar skin) are listed in the different languages on FASCIA and APONEUROSIS. Palmar creases. In the palm there are three longitudinal and two transverse creases. The longitudinal creases are the thenar, the central and the hypothenar. The most constant and easily differentiated is the thenar crease, due to the wide mobility of the carpo-metacarpal joint of the thumb. The central and hypothenar creases are the reflection of the mobility at the carpometacarpal joints of the ring and small fingers. The two transverse creases are the proximal and the distal. The distal crease starts at the ulnar side of the hand and finishes in between the middle and index fingers, as most of the hand functions are done with the ulnar fingers in flexion for power grasp, while the index and the thumb remain in extension for precision manipulation. The middle finger can either help the thumb and index for manipulation, or the ring and small fingers if more power grasp is needed. The proximal crease starts at the radial side of the hand along with the longitudinal thenar crease. Flexion of the metacarpo-phalangeal joints takes place in a transverse line between the origin of the distal palmar crease on the ulnar side and the proximal palmar crease on the radial side. Individuals with Down's syndrome just have one transverse palmar crease. Digital creases. Usually there are two creases at the level of each joint, the proximal one. The palmar digital crease of the triphalangeal fingers is usually located at the proximal third of the proximal phalanx. The palmar digital crease of the thumb is longitudinally oriented and slightly proximal to the metacarpo-phalangeal joint.

IFSSH SC Report in Chapter 1 on Anatomy discerns 1.1. General Terms, 1.2. Bones, 1.3. Joints, 1.4. Muscles, 1.5. Tendons, 1.6. Fascia and Aponeurosis, 1.7. Nerves, 1.8. Vessels, 1.9. Skin and Accessories. Subchapter 1.9. as in table:

| Cutis          | Epidermis      | Corium, dermis | Cristae cutis | Tela subcutanea             |
|----------------|----------------|----------------|---------------|-----------------------------|
| Skin           | Epidermis      | Dermis         | Rugae         | Subcutaneous tissue Finger prints |
| Sulci cutis    | Linea carpipalmaris: proximalis et distalis | Sulcus longitudina listenaris, lateralis | Sulcus longitudinalis medianus, intermedius | Sulcus longitudinalis hypotenaris |

Table 1. IFSSH Report. Subchapter 1.9 Skin ans accessories
3. Results and Discussion

Tendinous intersections and linea alba form round, pot like depressions superior to umbilicus, rectus fosae, rectusal hallows, (primo et secundo et tertium). The hollow wider and superior to fosae could keep water (mannerly aquae vitae) as topographic cup. Substernal triangle, surface pendant of xhipoid process, of pectoralis major, costal, rectus abdominis and sternum, form substernal fossa, or calix, and as to rectus fossae sequences of tendinous intersections[8].

The tendinous intersections define the anatomy of the rectus abdominis and assist with physiological movement. If the rectus abdominis did not have tendinous intersections, there would be one large muscle group on each side of the linea alba. This large muscle group would allow the vertebral column to flex forward, but would not permit a large extent of forward flexion. [9]

The rectus abdominis muscle, also known as the "abdominals" or "abs", is a paired muscle running vertically on each side of the anterior wall of the human abdomen, as well as that of some other mammals. There are two parallel muscles, separated by a midline band of connective tissue called the linea alba. It extends from the pubic symphysis, pubic crest and pubic tubercle inferiorly, to the xiphoid process and costal cartilages of ribs V to VII superiorly [10]. The proximal attachments are the pubic crest and the pubic symphysis. It attaches distally at the costal cartilages of ribs 5-7 and the xiphoid process of the sternum.

The rectus abdominis muscle is contained in the rectus sheath, which consists of the aponeuroses of the lateral abdominal muscles. Bands of connective tissue called the tendinous intersections traverse the rectus abdominus, which separates this parallel muscle into distinct muscle bellies. The outer, most lateral line, defining the "abs" is the linea semilunaris.
One should make difference between sacral dimples, sacral triangle, pilonidal dimples, and phenomenon of coccygeal fossa (located within intergluteal, fessura interglutea as slight depression, pot or olla) [8].

A sacral dimple (also termed pilonidal dimple or spinal dimple) is a small depression in the skin, located just above the buttocks. The name comes from the sacrum, the bone at the end of the spine, over which the dimples are found. On sacral dimple wroted also [11] and [12].

Sacral dimples are rare, occurring in up to 4% of the population. The majority of these dimples are minor and do not represent any underlying disease; however, the minority may be a sign of disease, notably spina bifida. Even so, this is usually the spina bifida occulta form, which is the least serious kind. [13]

The coccyx consists of an apex, base, anterior surface, posterior surface and two lateral surfaces. The base is located most superiorly, and contains a facet for articulation with the sacrum. The is apex situated inferiorly, at the terminus of the vertebral column.

Pellis laxa (Olecranon skin) is phenomenon of loose skin of elbow, that is relatively non-sensitive to touch. This pelma (fragosus) is also called called solea (as sole skin of external hand, situated around the joints, scrotal skin, perineal skin and skin of elbow). Male pubic sole skin is, however, the gender distinguishing phenomenon. Sole skin is consequences of stretched flexion of most frequent movements, not to shrinking and on inner parts of limbs.

Solea dimples (or solea), four consecutive dimples in the root of fingers, formed between metacarpal bone and proximal phalanges as consequences of stretched flexion in folding of metacarpophalangeal joint. [8]

### Table 2. Skin creases and folds of the head and neck area

| Head and neck area | Name of the crease                  | Name of the fold                  | Other terms used in literature for the crease |
|--------------------|-------------------------------------|----------------------------------|-----------------------------------------------|
| Upper eyelid crease| Lower lid crease                    | Alar–facial crease               | Labiomandibular crease                        |
| Nasolabial crease  | Postauricular crease                | Upper eyelid fold                | Labiomandibular crease                        |
|                    |                                     | Nasolabial fold                  | Postauricular groove                          |

### Table 3. Skin creases and folds of the lower limb area

| Subunit             | Name of the crease                   | Name of the fold                  | Other terms used in literature for the crease |
|---------------------|-------------------------------------|----------------------------------|-----------------------------------------------|
| Popliteal fossa     | Transverse skin creases of the popliteal fossa |                                  |                                               |
| Foot                | Proximal crease                      | Distal crease                    | Transverse lines                              |
| The plantar surface area | Tibial longitudinal crease            | Medial longitudinal crease        | Longitudinal line                             |
|                     | Fibular longitudinal crease          |                                  |                                               |
| Subunit               | Name of the crease                              | Name of the fold                   | Other terms used in literature for the crease               |
|----------------------|------------------------------------------------|-----------------------------------|-------------------------------------------------------------|
| The 1st toe          | Proximal crease                                |                                   |                                                             |
|                      | Interphalangeal crease                         |                                   |                                                             |
| The 2nd - 4th toe    | Proximal toe crease                            |                                   |                                                             |
| area                 | Medial toe crease                              |                                   |                                                             |
|                      | Distal toe crease                              |                                   |                                                             |
| The 5th toe area     | Proximal toe crease                            |                                   |                                                             |
|                      |                                                |                                   |                                                             |
| Table 4. Skin creases and folds of the upper limb area |

| Subunit         | Name of the crease                      | Name of the fold                  | Other terms used in literature for the crease               |
|-----------------|----------------------------------------|-----------------------------------|-------------------------------------------------------------|
| Axillary area   | Upper axillary crease                  | Anterior axillary fold            |                                                             |
|                 | Lower axillary crease                  | Posterior axillary fold           |                                                             |
|                 | Axillary creases                       |                                   |                                                             |
|                 | Lower axillary crease                  |                                   |                                                             |
| Elbow area       | Flexion creases of the elbow           |                                   | Transverse crease of the elbow                              |
| Wrist area       | Transverse skin creases of the wrist    | Anterior transverse lines         |                                                             |
|                 | Distal wrist crease                    | Distal bracelet crease            |                                                             |
|                 | Middle wrist crease                    | Intermediate crease of the wrist  |                                                             |
|                 | Proximal wrist crease                  | Proximal wrist crease             |                                                             |
| The digits       | Proximal phalangeal crease             | Proximal set of 2 transverse lines|                                                             |
| The thumb area   | Distally based proximal phalangeal crease|                                   |                                                             |
|                 | Interphalangeal crease                 |                                   |                                                             |
| The 2nd–5th digit area | Proximal digital creases            | Metacarpophalangeal crease or proximal set of transverse lines |                                                             |
|                  | Medial digital creases                 | Middle set of transverse lines    |                                                             |
|                  | Distal digital creases                 | Distal set of transverse lines    |                                                             |
| Dorsal surface of the hand | Transverse creases over the            |                                   |                                                             |
|                      | radiocarpal and carpal joints          |                                   |                                                             |
|                      | Transverse creases over the            |                                   |                                                             |
|                      | metacarpophalangeal joints             |                                   |                                                             |
|                      | Transverse creases over the            |                                   |                                                             |
|                      | interphalangeal joints                 |                                   |                                                             |

The skin creases of the human body are fixed and permanent anatomic landmarks characterized by various relationships with the underlying tissues.

In the literature, the terms “creases” and “folds” are found to be referring to the same anatomic structure. The skin crease as a fixed and permanent line, as it is obvious from the underlying structures or extensions of the underlying muscle fibers in the dermis of the crease site. The skin fold is characterized by skin redundancy that
is responsible partly, often in combination with connective tissue attachments, for the skin crease. [14]

To [15] a crease is an anatomic structure that is a visible line in the skin, fixed and permanent, and characterized by skin rest, attached to the underlying structures. The term sulcus refers to the groove, trench, or histology studies, is related to connective tissue attachments with the furrow, a general term for a depression.

Skin creases of the human body as in Tables 2, 3, and 4. a Facial creases: upper eyelid crease, nasolabial crease, alar – facial crease, labiomandibular crease. b Palmar creases: Transverse wrist creases of the wrist, longitudinal palmar creases, transverse palmar creases, proximal phalangeal creases, interphalangeal creases, proximal digital creases, medial digital creases, distal digital creases. c Inframammary crease, flexion creases of the elbow, suprapubic crease, crease of the groin, infragluteal crease, transverse creases of the popliteal fossa [15] [6].

**Table 5.** Missing partial topologies (exemplifying neck, hand, elbow, neck, rectum and heel)

| Skin creases             | Dorsal hand Fork lines Distal and proximal (creases with solae) | Wrist creases Armilla (Prima Secunda Tertia Quatro) | Frontal neck lines Retro neck lines | Achilles lines (heel lines) |
|--------------------------|-----------------------------------------------------------------|----------------------------------------------------|------------------------------------|-----------------------------|
| Loose skin               | Elbow Pellis laxa (Olecranon skin)                             | Scrotal skin                                       | Perineal skin                      | Pubic sole skin             |
| Fossae                   | Rectus Rectusal fossae (Primo Secundo Tertium)                 | Rectusus hallows Substernal fossa                  | Cocygeal fossa                     |                             |

The creases are produced by adhesion of the skin to the deep fascia and are sites of folding of the skin during movement. The digital creases do not lie directly over the associated joints. At the volar area of the wrist, the transverse skin creases of the wrist or the anterior transverse line are two to three in number. They are the distal wrist crease or the distal bracelet crease, the middle wrist crease or the intermediate crease of the wrist, and the proximal wrist crease or the proximal crease of the wrist or the proximal bracelet crease.

For instance Bugbee and Botte [16] see correlations between creases and osseous anatomy: Markers placed along palmar skin creases of 53 hands radiographically demonstrated creases superimposed on osseous anatomy. The distal and middle digital creases were found to be consistently proximal to associated interphalangeal joints by 7 to 8 mm and 2 to 3 mm, respectively. Proximal digital creases were consistently distal to associated metacarpophalangeal (MCP) joints by 14 to 20 mm. Distances between the distal transverse palmar crease and associated MCP joints were 6.8 to 10.3 mm.
Figure 1. Effect of xiphoid process, substernum and rectus (rectal primo, secundum)

The upper eyelid crease is located 8 to 12 mm above the lashes of the upper eyelids and is formed by the subcutaneous insertions of the terminal fibers of the levator aponeurosis. The fold is created by the excess skin and muscle that overhangs the crease. The absence of the upper eyelid crease is estimated in about 70% of East Asians due to the lack of the attachments of the aponeurosis. If it is present, it is approximately 46 mm above the lashes' margin. The lower lid crease is less well defined as there are no subcutaneous insertions corresponding to those of the upper lid. The alar facial crease is an important crease that frames the nose at the junction of the nasal alar and the cheek. The same structure can be found in literature as the nasolabial groove that is continuous above the nasal ala with the circular groove (sulcus). The alar sulcus is a groove in the skin bounding the nasal alae above and joining the nasolabial sulcus lower limb area. In the popliteal fossa, there is the transverse skin crease of the popliteal fossa. The creases at the foot area, especially of the plantar surface, have also been studied concerning their embryological development as described above for the palmar and digital crease, and the majority of them is also developed by the 15th week of gestation. The creases on the plantar surface of the foot are not as complex or constant or so well marked as on the palmar surface of the hand. On the plantar surface of the foot, we find the transverse lines and the longitudinal lines. There are two transverse lines, the distal crease that extends from the fibular border of the foot to the first interdigital space and the proximal crease which is less constant even in a child. The longitudinal lines are the tibia longitude increase as the adduction crease of the big toe, the medial longitudinal crease that extends between the second and third toe and ends up running into the tibia crease, and the fibular longitudinal crease, a shallow furrow when it exists at the tibia side of fifth toe.

Author would like to add to this topographies neck and axillary creases or axillary lines. Some of the creases are not always present, like those of armillas (wrist crease), from absent of lines to number of four, or forehead, frontal and retro neck lines, axillary lines. Achilles lines, Calcaneal lines (heel lines), as the result of Achilles tendon to Calcaneus, and walking dynamics of heel flexion. See Table 4.
Palmar creases. In the palm there are three longitudinal and two transverse creases. The longitudinal creases are the thenar, the central and the hypothenar. The most constant and easily differentiated is the thenar crease, due to the wide mobility of the carpo-metacarpal joint of the thumb. The central and hypothenar creases are the reflection of the mobility at the carpometacarpal joints of the ring and small fingers. The two transverse creases are the proximal and the distal. The distal crease starts at the ulnar side of the hand and finishes in between the middle and index fingers, as most of the hand functions are done with the ulnar fingers in flexion for power grasp, while the index and the thumb remain in extension for precision manipulation. The middle finger can either help the thumb and index for manipulation, or the ring and small fingers if more power grasp is needed. The proximal creases tarts at the radial side of the hand along with the longitudinal thenar crease. Flexion of themetacarpo-phalangeal joints takes place in a transverse line between the origin of the distal palmar crease on the ulnar side and the proximal palmar crease on the radial side. [15] [16]

Figure 2. Flexion creases of the palmar surface of the hand and wrist

Digital creases. Usually there are two creases at the level of each joint, being most prory, inent the proximal one. The palmar digital crease of the triphalangeal fingers is usually located at the proximal third of the proximal phalanx. The palmar digital crease of the thumb is longitudinally oriented and slightly proximal to the metacarpo-phalangeal joint. The major research and contribution to this topic made International Federation of Societies for Surgery of Hand [5], and G. Kumar [4].

The survey found the existence of nervature and skin nervature specific dermal geometry (dermogeometry), similar to those of biogeometry, caulogeometry with logic dinamic lines as effect of movement, on the examples of ranged fork lines of fingers (phalangeal furca).

In fact, there are no skin lines in stricto senso but only ranks, interrupted forks, which act as dynamic or conglomerate lines. Also, specific network nervature of proximal dimples and circular organization of the upper phalagic lines on the outside where the circular involucrum turns into parallel lines, in the case of dynamic anatomy of the hand. Creases are ranked, forming first forks and in further development, dynamic pseudo lines. Dynamic geometry is logical in the
transformation of piled lines into functional folding lines, the specific spherical internal status forms rete, the surficial nervature of phalangeal solae (proximal solae).

By Bugbee and Botte the distal and middle digital creases were found to be consistently proximal to associated interphalangeal joints, quantification of these relationships should assist in hand examination and placement of surgical incisions and provide further insight into anatomic and functional relationships of the hand.[15]

Functional association of the Palmar creases overlying the various osseous structure of the hand have proved as an important anatomical landmark. [17][18]

The knowledge of these creases in relation to the osseous anatomy and the joints of the hand can be of great use to the operating surgeon in various procedures on hand such as for tendon repairs, corrective procedures for webbed fingers, carpal tunnel hand surgery, trigger finger surgery, ganglion cyst removal etc. In Dupuytren’s contracture accepted indications for surgical intervention include metacarpophalangeal joint contracture of 30° and any degree of proximal interphalangeal joint contracture. [17]

It is noted that there are dynamisms that need to be examined in accordance with dynamic movements, and that surface anatomy is in all a dynamic form that is explained by the dynamism of the internal status, but also with the dynamic benefits of the original topology, as in the case of wrinkles or various muscular constitutions.

Without these dynamic forms, the dynamic effect cannot be thoroughly understood because the external anatomy is not only a consequence of the composition, the classic anatomy, but also the dynamism of the surface and other manifold factors. [6][19]

4. Conclusions

The paper found the necessity of establishing a unique comprehensive system of surface anatomy given the fact that partial anatomies have already been nomenclated by expert researchers (in the case of folds) or professional associations (IFSSH). Surface anatomy contains, however, a whole series of still undefined and non-nomenclated phenomena that can be interpreted only by systematic research. This paper has supplemented some parts of the partial topographies in order to have a more complete proposal for the system of surficial dynamics maps.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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