Acupuncture Main Channels or Meridians: Visible Surfaces

Summary

Courses of main channels later known in the West as meridians were painted as lines on the human body in Chinese acupuncture charts from head and chest regions to hands and feet. However none faithfully follow paths taken by any known anatomical structures. However when the body is entirely covered in oil or some other reflective substance and posed in a similar manner to Ming dynasty drawings in a darkened room lit by only one light source, one can perceive reflections of light proceeding in much the same directions as those shown in acupuncture illustrations. This suggests they were drawn from observations of the living body rather than as yet unknown anatomical structures dissected after death.

Introduction

Categories of channels or vessels were described by Chinese medical practitioners as ‘main’, ‘branch’, ‘connecting’, ‘muscle’, ‘divergent’ and ‘extra’. The best known today are the main channels. Soulié de Morant [1] who had served in the French diplomatic corps in China renamed them as ‘Méridiens’ - see Figure 1. Their pathways have attracted attention as they were drawn with such care on the surfaces of acupuncture mannequins and charts. When unusual sensations, called de qi, are produced by manipulating a deeply inserted acupuncture needle, the Research Group of Acupuncture Anesthesia, Institute of Medicine and Pharmacology of Fujian Province [2] noted how 20% of 64,228 patients in twenty-eight hospitals in China described them as passing up and down short lengths of the course of a main channel when a needle is inserted anywhere along its length; while 0.4% described these sensations travelling much further distances almost all if not the whole of its length (Figure 2). When an abnormally tender region is needled, Western observers such as Travell [3] noted pain is often referred to some distant location from the hip region for example to the ankle. When compared to acupuncture charts, Western drawings of these two sites (the tender and referred) involve many of the same parts of the body linked by Chinese main channels - see Figure 3: this idea that Chinese and Western practitioners who had no knowledge of each other’s observations were describing aspects of the same phenomenon was first put forward by Mann [4] & Melzack [5], later supported by Macdonald [6] & Dorsher [7]. Yet another explanation has been advanced by authors such as Langevin [8], Bai [9] & Tao [10] who suggested networks of deep fascia might have been the source of the directions taken by main channels, that as can be seen from Figure 1 do not faithfully pursue any other known anatomical structures: for example no continuous vascular, lymphatic or neural structure travels from the head or chest to the foot or hand, as these main channels are shown to do.

Schorrenberger [11] described reports of drawings made by the coroner of dissections of the human body carried out by Chinese doctors following the execution of bandits during the Northern Song Dynasty (AD 960-1127); as Wong [12] describes, in ancient times doctors were not often encouraged to perform anatomical dissections, particularly as patients did not wish to leave their bodies for dissection. As Confucius said, “Our body with skin and hair comes from our parents. We must not mutilate it.”

Could there have been another reason altogether why Chinese practitioners took the trouble to illustrate these particular surfaces of the human body?

The theory I would like to present here is that the impetus to perform such an intricate study of surfaces of the human body may have been in keeping with advances in other disciplines such as architecture, armour, art, clothing and various postures of the body recommended in exercises. Optical studies produced ‘magic mirrors’ and a camera obscura. Mathematics and astronomy had
become so advanced navigators’ explorations and forecasts of eclipses became possible. Stone gnomons built tall enough to cast shadows of the sun not only to indicate the passing of time from day to day but also the seasons of the year. By the 5th Century AD, the number of days in a year had been calculated to be 365.243. To integrate their thoughts with such activities, did medical practitioners recommend a similar number of acupuncture points to be scattered as stars on the body connected by constellations of main channels? The earth’s ecliptic passage around the sun, the ‘yellow path’, was divided into twelve houses. Does this Figure explain why the same number of main channels on each side of the body? Or was this more to do with the number of great rivers in China?

Many practitioners of acupuncture dislike the geographical term ‘meridian’ being applied or mistranslated so recently by a European, Soulié de Morant. However this title might provide us with an idea. In geographical terms, lines of longitude flow over the surface of the earth from the North Pole to the South. Wherever one stands, there is a line of longitude beneath one’s feet. The name ‘meridian’ (‘meridies’, ‘mid-day’) occurs when the sun is directly overhead, as it is ‘solar noon’ not only here but everywhere else on that line however far north or south. Could each main channel link many parts of the body that under certain circumstances behave in a similar fashion to a line of longitude?

Unlike the geographical globe, the human body is composed of irregularly shaped structures whose cross-sections are not circular. Thus if the body happened to be presented in such a way that the surfaces of a particular main channel began to face the same way, their exact path within the body would not always be easy to predict. Indeed the irregularity of the structures of the human body might be the reason for the otherwise bizarre twists and turns the main channel pathways appear to take. Unlikely as this possibility may be, could this line of enquiry be one that the Chinese practitioners took such trouble to undertake?

**Surfaces of ‘Main Channels’ or ‘Meridians’**

The idea that the Chinese practitioners were interested in the direction surfaces of the body faced becomes more probable when one considers special names they gave. For example, while standing with one’s back to the sun at noon, the anterior and medial surfaces tend to be kept in the shade; so these surfaces were titled yin. Conversely, the posterior and lateral surfaces of the body and limbs were exposed to the sun and were therefore called yang - see Figure 4. Furthermore as Figure 5 reveals, six surfaces of each limb were given special yin and yang titles: 1) the most shaded anteromedial surface was titled taiyin (great yin); 2) the less well shaded medial surface was called jeuyin (absolute yin); 3) being even less in the shade the posteromedial surface was said to be shaoyin (lesser yin); 4) the posterolateral surface received the most sun and was therefore called tayang.
(great yang); 5) the lateral surface seeing somewhat less of the sun was given the title shaoyang (lesser yang); and finally 6) the anterolateral surface received even less exposure so was called yangming (sunlight yang).

In Figure 5, the tangents to the six numbered surfaces have been arranged on the sides of an imaginary octagon (a cross-sectional arrangement favoured in the building of some of the most beautiful pagodas and temples). Here the anterior and posterior surfaces of the octagon form a ‘mid-line plane’. Running parallel to the mid-line plane, the second and fifth tangents occupied the lateral and medial positions. While all the other tangents were presented at forty-five degrees to the mid-line plane.

It may be helpful to see where tangents maintained at the same angles would have touched the skin of a cross-section of the human body. In Western anatomy, Figure 6 [13] revealed a section of the left leg taken a hand’s breadth below the knee joint seen from above. Superimposed on this cross-section are sites where the six numbered tangents touch the skin when presented at the same angles to the mid-line plane as shown in Figure 5. It is worth noting the cross-section of the leg in Figure 6 is not circular; therefore sites where skin is touched by the six tangents are not arranged symmetrically. Furthermore this cross-section was made after death, so there is no circulation or normal muscle tone and the curvature of the skin will have changed accordingly.

Hand and Foot ‘Main Channels’ or ‘Meridians’

We do not know why, but the Chinese not only allotted each of six surfaces of the upper and lower limbs to a main channel but also named it after one of twelve internal organs - see Table 1. In this table, organs in the second column were anatomically superior to the rest - so they were considered to be connected to the main channels of the hand: indeed they were referred to as ‘hand main channels’. Meanwhile as the location of the organs in the third column of the table is more caudal, their main channels were designated ‘foot main channels’.

Table 1: Six surfaces of upper and lower limbs together with the organs they were named after. The acronyms for each organ are taken from WHO 1984.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Surfaces</th>
<th>Hand</th>
<th>Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Taiyin (Great Yin)</td>
<td>Lung (LU)</td>
<td>Spleen (SP)</td>
</tr>
<tr>
<td>2</td>
<td>Jueyin (Absolute Yin)</td>
<td>Pericardium (PE)</td>
<td>Liver (LR)</td>
</tr>
<tr>
<td>3</td>
<td>Shaoyin (Lesser Yin)</td>
<td>Heart (HT)</td>
<td>Kidney (KI)</td>
</tr>
<tr>
<td>4</td>
<td>Taiyang (Great Yang)</td>
<td>Small Intestine (SI)</td>
<td>Bladder (BL)</td>
</tr>
<tr>
<td>5</td>
<td>Shaoyang (Lesser Yang)</td>
<td>Triple Energizer (TE)</td>
<td>Gallbladder (GB)</td>
</tr>
<tr>
<td>6</td>
<td>Yangming (Sunlight Yang)</td>
<td>Large Intestine (LI)</td>
<td>Stomach (ST)</td>
</tr>
</tbody>
</table>
Courses of hand and foot main channels are shown in Figure 7 A & B by Mann [14]. One can see that each surface faces much the same way during its path in upper and lower limbs. Indeed to check the course of those surfaces that are forty-five degrees to the mid-line plane, one can employ an isosceles right triangle obtained by cutting a square block along its diagonal. Place this triangular structure on a limb in such a way that one side is kept perpendicular to the mid-line plane. As shown in Figure 6, wherever it first makes contact with the limb, this location is likely to be the surface of an obliquely placed main channel.

Anatomical Positions and Other Poses

When attempting to discover the surfaces of main channels in Chinese medicine what was the ‘anatomical position’ of the subject? As this places the surfaces of the hand main channels in somewhat similar positions to those of the leg, it has been suggested the Chinese anatomical position may have required the forearm to be held half-way between pronation and supination, as shown in the life sized bronze replica of the human body originally cast in the 12th Century AD, see Figure 8. However to show the paths taken by each main channel, a much bolder approach was taken. In Ming Dynasty drawings a different pose or anatomical position was recommended for each channel (Figures 9 & 10).

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If we take the Bladder foot main channel for example, at first sight, if the subject was stood in the Western anatomical position, it does indeed pursue the posterolateral taiyang (great yang) surface at forty-five degrees to the mid-line plane but only during its course in the lower limb. While standing in this way, the posterior aspects of the trunk, neck and head traversed by this main channel become ninety degrees to the mid-line plane of the lower limb. However the pose chosen for the Ming dynasty drawing of the Bladder main channel was presented in a strikingly different manner - see Figure 10 example 4 and Figure 11. Here the trunk is turned to the right with the legs placed very far apart; while the head was rotated firmly to the left. This stance required considerable suppleness but does succeed in bringing all surfaces of the Bladder main channel to forty-five degrees to the mid-line plane of the leg.
Could the Paths of Main Channels Have Been Made Visible?

When the human body is entirely covered in a reflective substance such as oil and posed in the same way as the Ming Dynasty drawings see Figs 9 and 10, a ‘line’ of brightly reflected light can be observed along many parts of the body. This is perceived as a ‘line’ travelling along regions of the body that are highly curved in cross-section such as the forearm; but where a relatively flat region occurs such as the side of the hand, the highlight becomes a good deal more spread out.

The number of lines seen on the body in this way at any one time depends on the number of light sources. To make these observations the subject covered in oil has to be presented in an otherwise completely dark room lit by only one lamp.

To find a pose that revealed a particular main channel, the light bulb was placed at the eye level of the observer in the immediate vicinity of the camera and its flash gun. Once a particular pose begins to show a ‘line’ of brightly reflected light following as much of the path of a main channel as possible, a photograph is taken (Figure 13).

Many parts of main channels such as hand, lateral shaoyang (lesser yang) could be seen in several different poses of the upper limb, head and neck. In almost all cases, however, to render as
much of the surface of any main channel visible at a time, I found
the most convenient pose was suggested in the Ming Dynasty
paintings, see Figures 9 & 10. Some of these poses, for example
the Bladder and Liver, were not easy to imitate as they required
the contortions of an acrobat. I also noted paths of the foot yin
surfaces could be exhibited by the simple device of externally
rotating the hip joint - see poses for the foot yin channels, Spleen,
Liver and Kidney (Figure 10, examples 1, 2 and 3).

Meanwhile various surfaces of the head itself are shared by
yang main channels of foot and hand - see Figure 9 examples 4,
5 and 6 and Figure 10 examples 4, 5 and 6. The anterior aspects
of the head display surfaces of two foot yang main channels -
Stomach and Bladder that appear to overlap, despite one being
derived from the antero- while the other from the posterolateral
foot yang surfaces; however the orbit provided a convenient site
to separate them – one from its lower and the other from its upper
margin.

Figure 12 is a photograph in negative form of a subject entirely
covered in oil and lit from only one light source. Here we may
see intermingling paths taken by the Gallbladder (GB) and Triple
energizer (TE) that form the lateral shaoyang (lesser yang)
surfaces of hand and foot in their progress over the surface of the
head and pinna. To reveal as many details as possible and retain
the anonymity of the subject, digital processing by Adobe Elements
was employed to produce a negative. In this way, the highlights
appear as dark lines as compared with surrounding regions. This
technique has been employed here to indicate the highlights that
could be perceived along surfaces of the regions of the oiled body
placed in a similar pose to the Ming Dynasty painting of the hand,
anterolateral, yangming (sunlight yang) surface of Large Intestine
(LI) channel – see Figure 13; here more attention might have been
paid to the position of the head, as this was not rotated enough
to match the position recorded in the Ming Dynasty pose. Indeed
while taking these photographs, it took an hour or so to find the
correct pose to display as much of the course of a ‘main channel’
or ‘meridian’ as possible.

This leads one to suggest there is a possibility that these Ming
dynasty Figure of main channels (Figures 9 & 10) were drawn
from life, with subjects soaked in a light-reflective substance such
as water, oil or sweat and posed in front of a single light source.

Conclusion

Why it was so important to study the paths of these particular
surfaces of the body in such a manner is worthy of ongoing
speculation. The main channel concepts may have been a scholarly
way of explaining to patients why practitioners were looking for
tender regions placed at some distance from where the patient
was complaining of a referred pain, and the fact that a main
channel was considered to travel from say the foot to the head
may have recommended practising the non-segmental effects of
noxious stimulation such as inserting an acupuncture needle a
long distance away from the complaint.

Presenting the body’s surfaces in this manner was not intended
to indicate the anatomical paths of deeply lying structures
but rather to present the observer with an understanding of
something more functional in terms of the relationship of the
body to the environment. For example, our understanding of
the nervous system and withdrawal reflexes today suggests the
effects of an acupuncture needle applied anywhere along at least
some of the length of a surface of the body that presents in the
same direction might well inhibit underlying agonist muscles
and other neural inputs underlying that surface and facilitate the
coordinated actions of antagonist muscles to withdraw the body
from the noxious stimulus.

This hypothesis is in line with a suggestion by Zhao 2008:
“Given that the meridian theory has been effectively used for
treatment in traditional Chinese medicine, it is conceivable that
the meridians might be a functional, but not an anatomical, concept
that includes a summation of multiple physiological functions,
including the nervous, circulatory, endocrine and immune systems. It is well known that the concept of the constellation has played an important role in astronomy and navigation for a long time. The meridian system might resemble the concept of the constellation in which fictive lines (channels) link various stars (acupoints)."

References