

Biological macro-idea and criterion of osteopathic fracture immobilization in China's traditional mongolian medicine

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RESULTS: Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on the fixation criterion of macro-idea and method as well as on geometry, mechanics, motion, and stress and psychological stability in "non-sheltered fixation" of fractures contained in the life view of nature, regarding the relationship between man and universe (including psychosomatic integration) and on harmony between the limbs and the whole body, between body and function, and between man and nature.

CONCLUSIONS: Osteopathic fracture immobilization in China's traditional Mongolian medicine is fixation without trauma or shelter. The principle and method of whole, dynamic, and functional fixation of fractures is not only radical, but also represents a new direction for developing the principle and method of fracture immobilization.

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Key words: Osteopathy in China's traditional Mongolian medicine, External fixation, Self Fixation, Biological fixation, Macro-idea, Norm

INTRODUCTION

A peculiar osteopathy treatment in traditional Mongolian medicine handed down from ancient times in the Keerqin grasslands area in Inner Mongolia involves unique manipulation and has been used with a miraculous curative effect^[1,2]. For many years, people have valued its application but have paid little attention to its development, and little is known about its method of fracture immobilization. No importance has been attached to research of its biological significance. Fracture immobilization is a link between repositioning and healing. Proper fixation can not only consoli-

Abstract

OBJECTIVE: To investigate the biological macro-idea and criterion of osteopathic fracture immobilization in China's traditional Mongolian medicine.

METHODS: Based on biological naturalism regarding the relationship between man and universe (including psychosomatic integration) in osteopathic fracture immobilization in China's traditional Mongolian medicine, we used modern physiopsychological and biomechanical principles and methods to investigate the biological macro-characteristics of humanization, behaviorism, and wholism in "dynamic" fixation of fractures.

date the effect of repositioning, but can also promote healing speed and quality. In spite of the presently high level of technique required in fracture immobilization, it is an unavoidable fact that "internal and external fixation" under the background of "surgical reposition" brings various sequelae such as functional (including psychological) defects after healing. This problem is illustrated by the fact that despite having received the best technical therapy in the world after injury, Yao Ming, Zhao Ruirui, and other famous athletes regretfully terminated their sporting careers because there was no way to restore function. Osteopathic fracture immobilization in China's traditional Mongolian medicine, originating from nature, life, and practice^[1,2], has been used so far in China because of its superiority in terms of conveniently obtained materials, simple and easy method, and lack of trauma, shelter, and sequelae^[2,3].

In recent years, with the westernization and marketability of traditional Chinese medicine, the traditional method of fracture immobilization has been less and less used and much less developed and applied in terms of its bioscientific significance. The unique skill handed down for hundreds of years is facing the danger of extinction. Its succession and development must be enforced^[5,6].

MODEL OF OSTEOPATHIC FRACTURE IMMOBILIZATION IN CHINA'S TRADITIONAL MONGOLIAN MEDICINE

The method of osteopathic fracture immobilization in China's traditional Mongolian medicine originated from long-term observation and accumulation of fracture immobilization and healing phenomena and from unique thought and practice^[2,3]. The method of natural fixation of fractures integrates an external fixation system of splintlets (or sandbags) with a spontaneous fixation system. The former consists of four to eight thin willow plates, three bandages, and some pads; the latter consists of applying force on the fracture section and "splint force" on surrounding muscles, tendons, skin, and other soft tissues^[7,8]. In Figure 1, three vertical active lines in the axial direction of the bone represent three splintlets, three horizontal dotted lines in the horizontal direction of the bone represent three bandages (near, middle, and far ends of the fracture), G represents the horizontal force (binding force) of the bone, N represents the axial force (external force) of the bone, A_0 represents the horizontal section of the bone, and α represents the angle between the normal line of the fracture plane and the axial line of the bone. Elasticity of the splintlets (or sandbags) plus suitable tightness of the binding force G results in "dynamic" fixation. It should be pointed out that osteopathy treatment in China's traditional Mongolian medicine advocates not

using external fixation for stable fractures and other general fractures, but instead mainly relying on the human potential of spontaneous fixation. External fixation, if used, only acts as an auxiliary fixation to strengthen spontaneous fixation^[9].

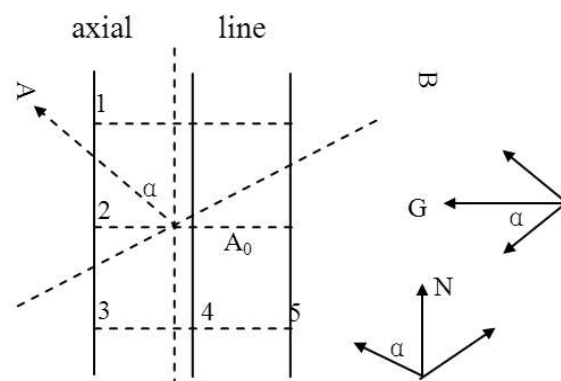


Figure 1 Model of osteopathic fracture immobilization in China's traditional Mongolian medicine (from left to right): normal line, axial line of bone, fracture plane.

BIOLOGICAL MACRO-IDEA AND METHOD OF OSTEOPATHIC FRACTURE IMMOBILIZATION IN CHINA'S TRADITIONAL MONGOLIAN MEDICINE

Fractures damage "psychosomatic integration" and the "correspondence between man and universe". Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on "psychosomatic integration" to mobilize physiological and psychological mechanisms and make fullest use of the inserting force of fracture ends and the physiopsychological instinct of surrounding muscles, tendons, skin, and other soft tissues to undergo spontaneous fixation^[12]. This type of immobilization is also based on "correspondence between man and universe" to mobilize human and natural mechanisms to make fullest use the auxiliary function of splintlets (or sandbags) in external fixation^[12]. The integration of spontaneous fixation and external fixation forms a unique method of fracture fixation. Obviously, this therapy achieves natural, sealed, opened, spontaneous, and non-sheltered fixation of fractures through mutually supplemented harmony and perfect unification between the sealed system of "psychosomatic integration" (which cannot be intervened) and the open system (which can be intervened). Therefore, osteopathic fracture treatment in China's traditional Mongolian medicine is based on the biological macro-idea and method of "non-sheltered fixation" of fractures contained in the life view of nature on integration of the limbs and body, unification of the body and its function, and "correspondence between man and universe" (including psychosomatic integration)^[12].

BIOLOGICAL MACRO-NORM FOR OSTEOPATHIC FRACTURE IMMOBILIZATION IN CHINA'S TRADITIONAL MONGOLIAN MEDICINE

Fractures damage the continuity of bony tissues and the wholism of bony functions, leading to loss of control of motion^[10,11]. According to the biological macro-idea of natural, sealed, open, spontaneous, and non-sheltered fixation of fractures and in continuous practice, a norm of fracture immobilization suitable for the functional structure of bony tissues has been formed in China's traditional Mongolian medicine^[13].

Biological macro-norm of geometric stability of "dynamic" fixation of fractures

Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on continuity and wholism in the mechanical adaptation of human bony tissues to pursue geometric stability at fracture ends. The following contents can be understood by analyzing the structural features of the model of fracture immobilization^[14] (see Figure 1).

Three binding points (1, 2, and 3) on each splint in the axial direction of the bone form structural stability of the "three points and on line" type, and three binding points (3, 4, and 5) in each binding plane vertical to the axial line form structural stability of the "three points and on plane" type, thus forming three-dimensional structural stability of fracture immobilization.

The mechanical significance of structural stability of osteopathic fracture immobilization in China's traditional Mongolian medicine is as follows: three-dimensional structural stability of fracture immobilization is the prerequisite for mechanical adaptation at the fracture ends. It can be seen that the correct position and correct line of fracture immobilization can be used to control mechanical adaptation at the fracture ends.

In osteopathic fracture immobilization in China's traditional Mongolian medicine, the correct horizontal position is the basis of the correct axial line, and the latter is the aim of the former, thus maintaining the stability of the correct axial line and correct horizontal position at the fracture ends (namely the state of geometric stability). The significance of this is as follows: Geometric stability is the basis of mechanical adaptation of fracture immobilization, and the latter is the aim of the former, thus providing the fracture ends with a good environment for geometric stability. In China's traditional Mongolian medicine, geometric fixation of fractures is achieved by "correspondence between man and universe" (including psychosomatic integration) and by harmony and unification between mechanical adaptation and geometric stability. The elasticity of splintlets and suitable tightness of the binding force contain the

biological macro-norm of geometric stability of "dynamic" fixation of fractures.

Biological macro-norm of mechanic stability of "dynamic" fixation of fractures

Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on continuity and wholism of the structural adaptation of human bony tissues to achieve mechanical balance at the fracture ends. From a force analysis of a fracture immobilization model, the following equation of mechanical balance in osteopathic fracture immobilization in China's traditional Mongolian medicine can be set up^[14] (see Figure 1):

$$dN \sin \alpha - dG \cos \alpha \leq k(dN \cos \alpha + dG \sin \alpha)$$

when α is constant

$$N \leq \frac{k \sin \alpha + \cos \alpha}{\sin \alpha - k \cos \alpha} G \quad (1)$$

The effective value of k is much higher than the friction coefficient of general materials. When α is small, the above-mentioned equation is set up.

The structural significance in the equation for mechanical balance of fracture immobilization is as follows: Mechanical balance of fracture immobilization is a full prerequisite for structural adaptation at the fracture ends. A small change in G results in a large change in N . It can be seen that the binding force G of fracture immobilization is used to control structural adaptation at the fracture ends.

In osteopathic fracture immobilization in China's traditional Mongolian medicine, the horizontal force is the basis of the axial force, and the latter is the aim of the former, thus maintaining the balance between the axial force and horizontal force at the fracture ends (namely the state of mechanical balance). The significance of this is as follows. The mechanical balance is the basis of structural adaptation of fracture immobilization, and the latter is the aim of the former, thus providing the fracture ends with a good environment for mechanical balance. In China's traditional Mongolian medicine, mechanical fixation of fractures can be achieved by "correspondence between man and universe" (including psychosomatic integration) and by harmony and unification between structural adaptation and mechanical balance. Elasticity of splintlets and suitable tightness of the binding force contain the biological macro-norm of mechanical stability of "dynamic" fixation of fractures.

Biological macro-norm of moving stability of "dynamic" fixation of fractures

Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on continuity and wholism of stress adaptation of human bony tissues to pursue stability of a moving state at the fracture ends (balance between static state and dynamic state). The equation for stress adaptation of osteopathic fracture immobilization in China's traditional Mongolian medi-

cine can be set up^[15] from equation (1) for mechanical balance of fracture immobilization. When α is constant,

$$\sigma = \frac{G_x}{2A_0} \sin 2\alpha + \frac{1}{2A_0} [G_g \sin 2\alpha + N(1 + \cos 2\alpha)] \quad (2)$$

the constant binding force G_x is obtained when there is no functional activity. The intermittent binding force G_g is obtained when there is functional activity.

The dynamic significance of equation (2) for stress adaptation of fracture immobilization is as follows:

In equation (2), $\frac{G_x}{2A_0} \sin 2\alpha$ related to constant binding force G_x is called constant physiological stress^[16], which is obtained under a "static" state at the fracture ends.

In equation (2), $\frac{1}{2A_0} [G_g \sin 2\alpha + N(1 + \cos 2\alpha)]$ related to intermittent binding force G_g is called intermittent physiological stress^[16], which is obtained under a "dynamic" state at the fracture ends.

In osteopathic fracture immobilization in China's traditional Mongolian medicine, the "static state" is the basis of the "dynamic state", and the latter is the aim of the former, maintaining the balance between the static and dynamic states at the fracture ends. The significance of this is as follows. Moving stability is the basis of stress adaptation of fracture immobilization, and the latter is the aim of the former, thus providing the fracture ends with a good environment for moving stability. In China's traditional Mongolian medicine, "dynamic" fixation of fractures is obtained by "correspondence between man and universe" (including psychosomatic integration) and by harmony and unification between stress adaptation and moving stability. Elasticity of splintlets and suitable tightness of the binding force contain the biological macro-norm of moving stability of "dynamic" fixation of fractures.

Biological macro-norm of stress (function) stability of "dynamic" fixation of fractures

Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on the continuity and wholism of functional adaptation (or stress adaptation) of human bony tissues to pursue stability of the stress state (or functional state) at the fracture ends. Equation (3) for stress adaptation of fracture immobilization is set up from equation (2) for stress adaptation of fracture immobilization:

$$\sigma = \sigma_x + \sigma_g \quad (3)$$

The functional significance of equation (3) for stress adaptation of fracture immobilization is as follows^[17]: Constant physiological stress σ_x can increase the frictional force, decrease the shearing force, promote close insertion between bony sections, shorten the moving distance of newly generated bony cells, and accelerate the speed of fracture healing, thus contributing to the formation of bones (functional adaptation).

Intermittent physiological stress σ_g can activate

bone-forming cells, generate bones, obstruct the activity of bone-destroying cells, and avoid absorption of bones, thus contributing to the activation of bone-forming cells (functional adaptation).

In osteopathic fracture immobilization in China's traditional Mongolian medicine, physiological stress is the basis of functional adaptation, and the latter is the aim of the former, maintaining the balance between bony generation and bony destruction at the fracture ends (namely the state of stress stability or functional stability). The significance of this is as follows. Stress stability is the basis of functional adaptation of fracture immobilization (including automatic repositioning of small angle dislocations), and the latter is the aim of the former, providing the fracture ends with a good environment for stress stability (or functional stability). In China's traditional Mongolian medicine, stress (or functional) fixation of fractures is achieved by "correspondence between man and universe" (including psychosomatic integration) and by harmony and unification between functional adaptation and stress stability. Elasticity of splintlets and suitable tightness of the binding force contain the biological macro-norm of stress (or functional) stability of "dynamic" fixation of fractures.

Biological macro-norm of psychological stability of "dynamic" fixation of fractures

Osteopathic fracture immobilization in China's traditional Mongolian medicine is based on continuity and wholism of mechanics, structure, stress, and functional adaptation of human bony tissues to achieve psychological stability. Maintaining physiological and psychological stability is an instinct of the human body. Under normal conditions, the skeleton relies on the surrounding muscles, tendons, skin, and other soft tissues to maintain the postures and moving states of the human body, namely the state of human physiological and psychological stability.

The mechanical, structural, dynamic, and functional significance of psychological stability of fracture immobilization^[13] is as follows: Fractures promote dysfunction in self-control and self-healing of the human skeleton, but some parts are always maintained and restored. On the basis of this condition, wine-spouting massage is applied in installments on swelling sites of muscles and tendons, binding points and related acupoints to stimulate physiological and psychological mechanisms and mobilize the instincts of self-control and self-healing of muscles, tendons, skin, and other soft tissues^[18]; namely, to strengthen the instinct of spontaneous fixation. On the other hand, functional exercise should be performed as soon as possible, in order from psychology to physiology and from the far end to the near end to promote coordination between physiology and psychology and strengthen the adaptation of mechanics, structure, stress, and function; namely, to strengthen its function of external fixation^[18]. This can not only accelerate healing of limbs,

but can also promote restoration of function, including psychological function.

In osteopathic fracture immobilization in China's traditional Mongolian medicine, the physiological state is the basis of psychological stability, and the latter is the aim of the former, thus maintaining the balance between physiology and psychology; namely, the state of psychological stability. The significance of this is as follows: Psychological stability for fracture immobilization is the basis of adaptation of mechanics, structure, stress, and function, and the latter is the aim of the former, providing fracture ends with a good environment for psychological stability. In China's traditional Mongolian medicine, psychological stability of fractures is achieved by "correspondence between man and universe" (including psychosomatic integration) and by harmony and unification between mechanics, structure, stress, and functional adaptation on one hand and psychological stability on the other hand. Random changes in physiological and psychological states contain the biological macro-norm of psychological stability of "dynamic" fixation of fractures.

In summary, "dynamic" fixation of osteopathic fractures in China's traditional Mongolian medicine is based on the biological macro-idea and method for natural, sealed, open, self, and no-shelter fixation of fractures contained in biological naturalism of integration of the limbs and body, unification of the body and its function, and "correspondence between man and universe" (including psychosomatic integration)^[8,19] and is based on the fixation criterion of geometry, mechanics, motion, and stress and psychological stability^[13]. This is not only a radical foothold from which China's traditional Mongolian medicine can be used, but also represents a direction for the development of fracture immobilization therapy toward humanity, behaviorism, and wholism^[13,20].

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