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Case Report

# Effects of Sri Lankan traditional medicine on radius and ulnar fracture in non-union state without removal of internal fixator

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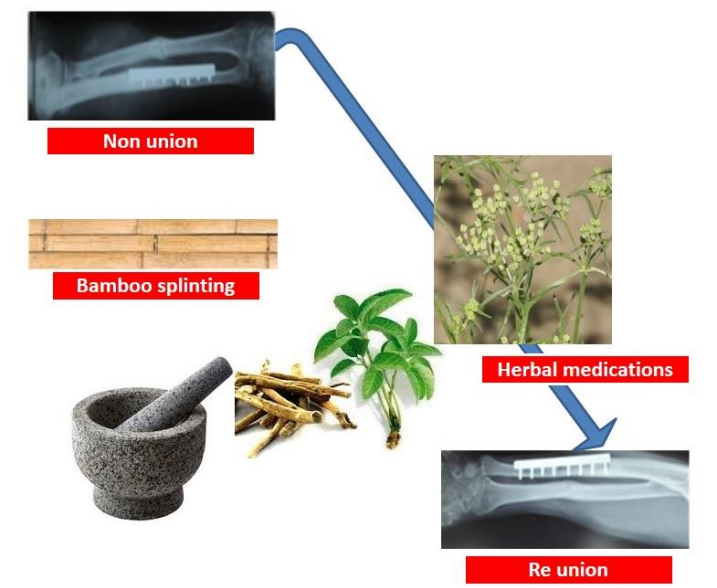
**ABSTRACT**

Diaphysis fractures of the radius and ulna are common among humans. Internal fixation using plate and screws is one of a method used for the bone immobilization and alignment. Sri Lanka has a well-established traditional fracture management system (*Kedum Bindum Vedakama*). In *Ayurveda*, *Sushruta Samhita* describes *Bhagna Chikithsa* (treatments for fractures). Fifty-one years old male patient had a compound fracture in radius and ulnar and treated with allopathic medicine with internal fixation. Following a year after applying internal fixation, his X-ray showed nonunion of the bones and he was attended to *Ayurveda* treatment. Initially, nonunion bones were immobilized for six months using bamboo splints and *Seethodaka* oil, *Pinda* oil *and katakaladi* paste was applied. A paste of *Navarathne* oral herbal medication was also given for the first six months. Further, oil application was continued for three more months without application of bamboo splint. Motor, sensory and quality of life assessment with international osteoporosis foundation quality of life index (IOFQLI) was performed on at regular intervals. Initial power of wrist and fingers were at grade 1 and at the end of 5-month it improved to grade 5. The IOFQOL scores were analyzed using Wilcoxon signed rank test. There was a significant ($p<0.05$) difference between the pre-treatment (17) and post-treatment (55) IOFQLI scores. Evidence of X-ray shows complete healing of fracture. This report signifies that using the methods and medicines in *Ayurveda* and traditional orthopedic system with allopathic diagnostic and prognostic indicators can successfully treat a nonunion of bones without removing the internal fixator.

**KEYWORDS**

Ayurvedic treatment, Fracture healing, nonunion, internal fixation.

**PICTORIAL ABSTRACT**

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## 1. Introduction

In modern medicine, permanent modes of immobilization are application of plaster of Paris cast, continuous traction, external fixation and internal fixation. Internal fixation is applied to control the limb fractures in early once the conservative methods would interfere with the management of associated severe injuries in head, thorax and abdomen. Also, is used in closed fracture once impossible to maintain the acceptable position by splint alone[1,2].

The common methods are the metal plate held by the screws or locking plates, intramedullary nail with or without cross screw fixation for locking, dynamic screw plate, condylar screw plate, tension band wiring and transfixion screws[3]. Plates and screws method is applicable for the long bones[4]. Materials in internal fixators are special stainless steel containing chromium, nickel, molybdenum and metallic element of titanium[5]. They are resistant to corrosion in the body. Some may have kept lifelong or removed following with bone healing. Some of the patients get complete healing with internal fixation. In some instances, complicated with mal union, delayed union or failed to respond with nonunion[6].

In management of fracture, the Ayurvedic medical system has a long history and it has vast array of methods. Nowadays it has been overlapped with traditional orthopedic methods which has in Sri Lanka. In past, traditional medical system was well developed and traditional physicians were able to handle the complicated fractures with better outcome. In ancient folk says Sinhalese had a very successful traditional orthopedic system and within hour traditional physicians can have the ability to heal the broken bones. Traditional medicine comprises vast array of topical herbal applications over fracture site including *Pattu*, *Mallum*, and Oil. In addition, oral herbal formulae are also being used. The treatment regimen, which describe here is used by the eminent Sri Lankan traditional physician family *Arangala veda parapura* to treat suffering from non-union fractures successfully.

Some instances, when patients' internal fixator complicated with a non-union[7], often tend to seek treatment from *Ayurveda*. The experience and knowledge of the Ayurveda physicians to treat this complicated scenario is less thus not encountered in past and not mentioned in the ancient texts. This case report provides evidence for treatment modes available for better outcome following internal fixation failure.

## 2. Case histroy

A 51 years old male patient having nonunion diaphysis fractures of ulnar and radius, one year after application of internal fixator has visited to orthopedic clinic at Bandaranaike Memorial Ayurvedic Research Institute (BMARI), Sri Lanka on December 2015. The patient was having healed wound (scars) over forearm and complained of restricted movements of wrist, fingers with wasting of forearm. The x-ray showed the nonunion of the radius and ulnar bones (Figure 1). He was having difficulties in flexion and extension of wrist. Further, movement of fingers also restricted and power was 1/5. Pain, edema, local tenderness and stiffness of the wrist joint and fingers were observed prior to initiation of *Ayurveda* treatment. Patient was treated with four treatment regimens over 9-months period.

**Figure 1. Sequential x-ray images from before, while on and following completion of treatment**


1a. Before treatment: Evidence of x-ray shows nonunion of the radius and ulnar (circles- nonunion in radius and ulnar) 1b. While on treatment (After 3 months): Evidence of x-ray show the callus formation (circle) of the radius and ulnar 1c. While on treatment (after 6 months): Evidence of x-ray show the partial remolding (circle) of the radius and ulnar. 1d. After treatment completion (after 9 months): Evidence of x-ray show the complete remolding of the radius and ulnar.

### 2.1 Treatment regimen

#### *2.1.1 First treatment regimen (day 1-60)*

In first two months, external application of *Seethodaka* oil[8] which consists the leaves juice of *Melia azadirachta* (*Nimba*) 120 ml was applied every other day (EOD) and *Bamboo* splints were applied in position of inferior and posterior of the forearm palm to elbow joint. Additionally, 5 grams of paste *Nawarathna*[8] was gave twice a day after meal during these 60 days.

#### *2.1.2 Second treatment regimen (day 61-120)*

Following 2 months of above treatment *Pinda* oil[8] which consists of root of *Hemidesmus indicus* (*Sharibha*) 120 ml was applied with bamboo splints and asked to perform passive and active exercises. In addition, 5 grams of paste of *Nawarathna* was gave twice a daily after meals.

#### *2.1.3 Third treatment regimen (day 121-180)*

In next two months 30 grams of paste of *katakaladi* applied with bamboo splints with 30 ml of *Pinda* oil. Paste of *Navarathne* was given as 5 grams twice a daily after meals.

#### *2.1.4 Forth treatment regimen (day 181-270)*

From day 181 to 270, paste of *Ashwagandadi* 30 grams applied without using the bamboo splints with 30 ml of *Maha Narayana* oil[8].

### 2.2 Preparation of drugs

All medicines were prepared at the pharmacy, Bandaranaike Memorial Ayurveda Research Institute, Nawinna, Maharagama, Sri Lanka, according to the Ayurvedic Pharmacopoeia, Department of Ayurveda, Sri Lanka. Oil of *Seethodaka* was prepared according to the methods mentioned in the classical text of Ayurveda pharmacopeia. Oils of *Pinda* and *Maha Narayana* were prepared according to the methods given in the classical text *Sri Sharngadhara Samhita*[9].

#### *2.2.1 Paste of Nawaratna*

Five grams of each of finely powdered seeds of *Cumminum cyminium* (*Jeeraka*), *Nigella sativa* (*Krishna jeeraka*), *Carum copticum* (*Ajomoda*), *Vernonia anthelminitica* (*Atavi jeeraka*), *Myristica fragrance* (*Jatiphala*), fruits of *Piper longum* (*Pippali*), mace of the fruits of *M. fragrance*, calyx of *Eugenia caryophyllus* (*Lavanga*), stem of the *Glycyrrhiza glabra (Yasti-madhu)*, roots of *Piccorrhiza curroa* (*Tikta*), rhizomes of *Zingiber officinalis* (*Shunti*), resins of *Ferula foetida* (*Hingu*), 130 grams of finely powdered pericarp of *Terminalia chebula* (*Abhaya*), and 65 grams of finely powdered pericarp of *Terminalia bellirica* (*Vibhitaka*) are ground well, adding honey, till it become a fine paste[10].

#### *2.2.2 Paste of Katakaladi*

Two hundred forty milliliters juice extracted from bark of *Bridelia retusa (Katakala)*, *Syzygium cumini* (*Jambu*) and *Hemidesmus indicus* (*Sariva*) and thirty grams powdered rhizomes of *Zingiber officinale (Shunti)*, fruits of *Piper longum* (*Pippali)*, stem of *Coscinium fenestratum (Daru haridra)*, pericarp of *Terminalia chebulla (Abhaya)*, pericarp of *Terminalia belerica (Vibhithaka)* and pericarp of *Phyllanthus embillica (Dhatri)* are added to it and heated until a semi solid paste is obtained.

#### *2.2.3 Paste of Ashwagandadi*

Sixty grams of powdered *Withania sominifera* (*Ashwagandha*), thirty grams of powdered *Vigno mungo* (*Masha)*, fifteen grams of powdered *Cinnamomum zeylanicam* (*Twak*) and fifteen grams of powdered *Syzygium aromaticam* (*Lavanga*) are grinded with 120 ml white egg and mixed with 60 ml of bee honey. It is a semi solid paste.

### 2.3 Assessment

***2.3.1*** *Evidence of x-ray*
***2.3.2*** *Assessment of motor function*
***2.3.3*** *Assessment of sensory function*
***2.3.4*** *Assessment of quality of life*

### 2.5 Statistical Analysis

The difference in the IOFQLI scores, sign and symptoms were analyzed using Wilcoxon signed rank test. Statistical software of SAS 9.1 version (USA) was used for the study[11].

## 3. Results and discussion

### 3.2 Motor function assessment and follow up

Prior to initiation of treatment power related to flexion, extension, adduction and abduction of wrist and fingers was graded as 1. After twenty weeks of treatment it improved to the normal level (Table 1).

### 3.2 Sensory function assessment and follow up

Sensory functions including sensation of pain, temperature, vibration and fine touch was intact at the commencement and throughout treatment.

### 3.3 Assessment of quality of life

Quality of Life asses by the IOFQLI wrist fracture questionnaire[12]. It consists of 12 parameters. Patient's quality of life from initial stage to final stage was displayed on table 2. Prior to initiating therapy, most of parameters of QOL were having minimum scores (total 17) while after 9 months it was significantly improved to 55 (P<0.001) indicating reverting the arm function in great.

This case study signifies the application of *Ayurveda* and traditional orthopedic treatment following the internal fixation failure. This patient's motor function and quality of life was improved significantly without demanding a surgery for internal fixator removal or further corrective surgery including bone grafting. In Sri Lanka, fracture management in modern alternative system has been integrated with *Ayurveda* and traditional orthopedic system. Traditional medical system comprises a list of numerous miraculous herbals that capable of increase fracture healing activity.

In the current case, even after one year, internal fixation callus formation was not perfectly initiated and ended up with non-union. Once, herbal medications have been applied in a methodical way over the immobilized fracture site, callus formation was initiated and propagated thus leading to enhanced healing with proper reunion. The followed treatment protocol comprises concepts of *Sodhana Chikitsa* (*purifying treatment*), *Shamana Chikitsa* (*pacifying treatment*) and *Tarpana Chikitsa* (enhancing treatment). First, we have applied the *Sodhana Chikitsa* (purifying treatment) which enhances the *Sroto Shodhana* (purify the channels) would initiate the callus formation at the fracture. The *Shamana Chikitsa* (pacifying treatment) comprises *Vata Shamana* (pacify the exacerbated *vata dosha*) over the fractured area and it helps to start the granulation tissue formation and strengthen the bone by enhancing the secondary callus formation. The *Tarpana Chikitsa* (enhancing treatment) comprises *Tarpana Guna* (enhance the nutrition) over the fractured area and it starts the remolding of the bone. These three treatment principles enhance the *Balya* (promote strength) over the non-union fracture and help in improving the qualities of *Asti Dhatu* (bones) and reformation of wasting tissues[13,14].

**Table 1. Motor function assessment of power of wrist and fingers**

| Parameter | Initial | 1 month | 2 month | 3 month | 4 month | 5 month | 6 month |
|---|---|---|---|---|---|---|---|
| Flexion | +1 | +2 | +3 | +4 | +4 | +5 | +5 |
| Extension | +1 | +2 | +3 | +4 | +4 | +5 | +5 |
| Adduction | +1 | +2 | +3 | +4 | +4 | +5 | +5 |
| Abduction | +1 | +2 | +3 | +4 | +4 | +5 | +5 |

**Table 2. Assessment of quality of life efore the treatment, 6 weeks, 3 months and 9 months**

| Category | Day-0 | 6-Weeks | 3 months | 6 months | 9 Months |
|---|---|---|---|---|---|
| Total IOFQLI score (60) | 17 | 26 | 35 | 43 | 55 |
| Pain | 1 | 2 | 3 | 4 | 5 |
| Stiffness | 1 | 1 | 2 | 3 | 5 |
| Numbness | 5 | 5 | 5 | 5 | 5 |
| Disturb | 2 | 2 | 3 | 3 | 4 |
| Wash or dry hair | 1 | 2 | 2 | 3 | 4 |
| Turn a door | 1 | 2 | 2 | 3 | 5 |
| Writing | 1 | 2 | 3 | 3 | 4 |
| Problem with working | 1 | 2 | 3 | 4 | 5 |
| Bicycle riding | 1 | 2 | 3 | 3 | 4 |
| Support with others | 1 | 2 | 3 | 4 | 5 |
| Other activities | 1 | 2 | 3 | 4 | 5 |
| Quality of life | 1 | 2 | 3 | 4 | 4 |

## 4. Conclusion

Conducting sequential X ray imaging, motor function examination and assessment of quality of life would guide us to follow the treatment protocol in great. Impact, in here integrated approach between methods of allopathic diagnostic, prognostic evaluation with application of miraculous herbal preparations and treatment protocol in *Ayurveda* has vastly curtailed to proper reunion. A follow-up large sample study will be important to assess the efficacy of given *Ayurveda* treatment protocol in great.

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