Case Report

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AN AYURVEDIC APPROACH IN THE MANAGEMENT OF NONUNION ULNAR SHAFT FRACTURE: CASE REPORT

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ABSTRACT

Introduction: The human skeleton possesses extraordinary regenerative capabilities, making it one of the rare structures in the body that can repair itself by restoring its typical cellular composition, arrangement, and mechanical strength. When the healing process of a broken bone is unsuccessful due to insufficient immobilization, unsuccessful surgical treatment, inadequate biological response, or infection, the result after an extended duration of no healing is termed non-union. Non-union signifies a lasting medical condition that not only influences function but also may adversely affect the person's psychosocial and economic health. Methodology: In the PG department of Shalya Tantra, a female patient arrived complaining of weakness, edema, and discomfort in her right forearm. In March 2023, she became connected with RTA. Her concerns and the findings of her previous X-rays led to the identification of the right ulnar nonunion. The patient has been experiencing pain, stiffness, and loss of function for the past eight months as a result of post-fracture sequelae. Ayurvedic conservative therapy has been used to improve the patient's quality of life. Result: Significant progress was observed with the use of internal and external Ayurvedic therapies, which effectively supported callus formation at the ulnar shaft fracture site. After a few sittings of treatment, improvement has been noticed, with swelling reduced by 80% and pain reduced by 90%. Discussion: When the normal healing process is disrupted, leading to delayed union or nonunion. Ayurvedic treatments, both internal and external, have shown potential in supporting fracture healing by promoting tissue regeneration, enhancing circulation, and reducing inflammation. Ayurveda plays a supportive role in stimulating callus formation, particularly in complex cases like non-union of the ulnar shaft.

Keywords: Anulbana bhagna, Ayurveda, Annalepam, Fracture, Non-union, Rehabilitation.

INTRODUCTION

Hematopoietic and immunological cells in the bone marrow work together to restore fractures, which is a complex physiological process[1,2]. Immobilization, rehabilitation, and bone reduction are the cornerstones of fracture care. In order to stop the broken parts from moving or angling, immobilization is advantageous[3]. Relatively little callus formation is a characteristic of primary (direct) fracture recovery[4]. Between 2 and 10% of all forearm fractures result in nonunion, whether or not there is infection or bone loss. With a higher occurrence in women following menopause, the incidence has been found to peak between the ages of 35 and 44 and then decline[5]. In a World Health Organization (WHO) research, the number of road traffic deaths globally decreased by 5% to 1.19 million per year between 2010 and 2021, with 108 UN member countries reporting a decrease. On the other hand, India had a 15% rise in deaths. India's overall road traffic deaths increased from 1.34 lakh in 2010 to 1.54 lakh in 2021, according to the WHO's Global Status Report on Road Safety 2023. A fracture that lasts at least nine months and manifests no signs of healing for three months is considered nonunion according to the FDA's most commonly used standard criteria[6]. Bone nonunion is caused by a number of physiological processes. A broken blood supply, for instance, lowers the fracture's ability to mend, which lowers osteogenic cells. Second, damage to the osteoconductive scaffold leads to less new bone development because bone must mend over a greater distance. Third, diseases like diabetes, peripheral vascular disease, vitamin D deficiency, renal insufficiency, and drugs (steroids, NSAIDs, and opiates)[7] are examples of abnormal biological processes that cause poor blood flow and poor bone healing. These conditions will also decrease blood flow and new bone formation by lowering the biologic growth factors needed for bone healing. Fourth, insufficient mechanical support at the fracture site could make the healing process more difficult[8]. When fractures are treated with modern methods, most of them heal without problems. Some fractures do not heal even with the best non-surgical or surgical care. In certain cases, certain risk factors enhance the chance that a bone won't heal. A fracture is said to be "nonunion" if it does not mend. Nonunion is caused by avascular necrosis, infections such osteomyelitis, improper fracture fixation, soft-tissue imposition, and the two ends not being opposed. The prognosis of nonunion is influenced by a number of factors, including as age, general health, time since the initial injury, previous surgeries, and smoking[9]. In Bhagna Chikitsa, Acharya Sushruta made reference to non-union, stating that incorrect bandaging or treatment of a fractured bone will result in non-union of the bone. Once a non-union forms, it must be treated as though it were a fracture. It hampers the healing process.

An orthopedic surgeon recommended surgical reduction of this patient with ulnar shaft fracture, which we report here. Since she was hesitant to have surgery, she came to an Ayurvedic hospital where she received treatment based on Ayurvedic principles. Due to post-fracture problems, the patient has experienced pain, stiffness, and loss of function for eight months. Ayurvedic conservative therapy has been used to improve the patient's quality of life.

Case Report

A female patient, age 31, arrived at OPD PG department of Shalya Tantra, SJSACH. complaints of pain, edema, weakness over the right forearm. She has previously been involved in RTA in March 2023. She was on Puttur bandage, but she removed the bandage within 4 weeks and by her complaints and the results of her prior X-rays diagnosed as nonunion of the right ulnar. She was taking medication, and when she went to an allopathic hospital, they recommended surgical reduction, but the patient was unwilling. For better care, she came to our hospital. The patient was having wasted forearm associated with restricted movements of arm including elbow, wrist and fingers. Physical examination revealed difficulty in pronation and supination of forearm and the power was 1/5. Pain, edema, local tenderness and stiffness over forearm and fingers were observed at the initiation of the Ayurvedic treatment. In Ayurveda we advised her for Sastra Karma (Surgical intervention), but the patient was unwilling. So we treated her with Samana Chikitsa (Internal medications) and Bahya Chikitsa (External therapy).

Clinical findings

Table 1: Local examination

Site	Right forearm
Length	40 cm
Width	25 cm
Temperature	++
Tenderness	+++
Deformity	-
Open wound	-
Crepitus	++
Effusions	-
ROM	Supination and pronation of forearm is difficult
Associated injury	Wound healed and scars marks visible

Ayurvedic examination

Table 2: Dashavidha pareeksha

Prakruti	Kaphapitta
Vikruthi	Vatakapha
Sara	Madhyama
Samhana	Madhyama
Pramana	Muscle wasting is seen
Satmya	Sarva rasa satmya
Satva	Madhyama
Aahara sakthi	Pravara
Vyayama sakthi	Avara
Vaya	Madhyama

Diagnostic Assessment

The complaints presented by the patient together with the interpretation of anterioposterior and lateral views of the X-ray right forearm, were diagnosed as ulnar shaft fracture (Figure 1).

Figure 1: Before intervention

Therapeutic intervention

Internal medications (1-14 days)
1. Lakshadi guggulu (1 – 0 – 1)
2. Gandarva hastadi eranda tailam

Internal medications (14 - 28 days)
1. Lakshadi guggulu
2. Dasamoola kashayam
3. Gandha tailam

External Therapy (1-14 days)
1. Murivenna – Pichu

External Therapy (14 - 28 days)
1. Murivenna – Pichu

External Therapy (28 – 42 days)
1. Murivenna pariseka
2. Annalepam

RESULT

Table 3: Timeline

May 2023	History of fall
June 2023	Diagnosed with Fracture
June 2023	Treatment
Aug 2023	Symptoms
Aug 2023	X-ray
Aug 2023	Internal Medicines (1-14 days) External Therapy (1-14 days)
Sep 2023	Observation Follow up after 14 days. Pain reduced. Swelling reduced Mobility partially improved 25% Internal Medications (14-28 days) External Therapy (14-28 days)
Oct 2023	Observation After 28 days X-ray showed evident callus formation. (Figure 2) Pain 90% reduced. Swelling 80% reduced Weakness persists.
Nov 2023	Admitted in IP ward for 2 weeks (28- 42 days)
Dec 2023	Patient came for follow up X-ray showed complete callus formation. (Figure 3)

After Intervention

Table 4: Follow up and outcomes

Site	Right forearm
Length	39.5 cm
Width	20 cm
Temperature	+
Tenderness	nil
Deformity	-
Open wound	-
Crepitus	+
Effusions	-
ROM	Supination and pronation of forearm is possible
Associated injury	Scar marks reduced

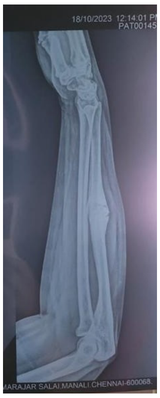

Figure 2: Callous Formation

Figure 3: After Intervention

DISCUSSION

Fractures typically heal without any issues. Even with optimal surgical and nonsurgical care, some fractures do not heal. Certain risk factors can sometimes increase the likelihood that the bone won't heal. A "nonunion" occurs when a fracture does not heal. Ashwagandha *(Withania somnifera)*, Nagabala *(Sida veronicaefolia)*, Kakaubha *(Terminalia arjuna)*, Laksha *(Lacifera lacca)*, Asthi shrungala *(Cissus quadrangularis)*, and Guggulu *(Commiphora mukul)* are all included in Lakshadi guggulu. Ashwagandha *(Withania somnifera)*, Laksha *(Lacifera lacca)*, and Asthi shrungala *(Cissus quadrangularis)* are among the medications that have the ability to cure bones. Every other medication has anti-inflammatory qualities, with the exception of Laksha *(Lacifera lacca)*. Bone regeneration is a function of Kakaubha *(Terminalia arjuna)*. Shigru *(Moringa oleifera)*, Paribhadra *(Erythrina indica)*, Kumari *(Aloe vera)*, Shatavari *(Asparagus racemosus)*, Palaṇḍu *(Allium cepa)*, Nagavalli *(Piper betel)*, Karanja *(Pongamia pinnata)*, and Vasuka *(Borreria hispida)* are among the plants found in Murivenna. Quercetin and Karanjin, two active ingredients in *Pongamia pinnata*, improve wound contraction[10]. The amino acids and essential oils found in piper betel help fibroblasts in wounds proliferate and re-epithelialize. *Aloe vera* contains gibberellin and glucomannan, which promote collagen production, wound contraction, and wound proliferation. The glycosides, flavonoids, and amino acids included in *Erythrina indica* aid in re-epithelialization[11]. *Borreria hispida* contains flavonoids, phenols, tannins, and saponins that have antioxidant and anti-inflammatory properties. The anti-inflammatory and vata-pacifying properties of Gandarvahastadi Eranda tailam are beneficial. In Ayurveda, the idea explains the connection between Doshas, Dhatus, and Malas. The Asthi dhatu, which has a direct impact on bone production, is impacted by vitiation of the Vata dosha[12]. The treatment for Marmabhighata (damage to critical spots) is Mustadi Marma Kashayam. Utilized primarily for fractures, dislocations, and inflammations. Dasamoola kashayam possesses strong antioxidant and anti-inflammatory qualities. It is frequently used to relieve inflammatory pains. Acharya Sushruta and Vagbhata both discuss the special formulation known as Gandha Tailam in relation to bhagna (fracture). Gandha taila is administered orally and it is said to be good to bestow sturdiness to the bone[13]. Vatahara, Brahamana, and Asthidhatu Vardhaka are among the attributes of Gandha taila. Pariseka is a karma from Swedena (Sudation). Swedana causes vasodilatation by which drugs enter the body. Acharya Sushruta claims that the four Tiryakdhamani progressively split off one hundred thousand times, becoming innumerable. Both the network and the body are linked to Romakoopa. Following Paka in the skin with Bhrajaka Pitta[14], Veeryas from Abhyanga, Parisheka, Avagaha, Alepa, etc. enter the body through them. According to contemporary theories, swedana functions when the body's metabolism rises. Swedana Ushna Guna improves circulation by enlarging capillaries. Increasing circulation promotes waste removal and enhances the skin's ability to absorb medications or Sneha. Additionally, heat management may have hypoanalgesic effects and aid in muscle rehabilitation. Annalepa is a kind of topical formulation, hence it should be gently rubbed over the skin in an upward or reverse direction of the hairs to make the application action faster and more efficient. Swedavaha Srotasa (sweat microchannels) and Siramukha (microchannel opening) absorb the treatment once it enters Romkupa[15] (hair follicle), producing the intended results. By opening the skin's appendages through perspiration, swelling blood vessels, and aiding in the absorption of medication, fermentation increases the skin's permeability. The outermost layer of skin is typically impervious to most substances. Milk contains phospholipids, which are a crucial component of cell membranes. Its amphipathic properties aid in the absorption of medications. This increased skin temperature speeds up the drug's penetration into the skin and pilosebaceous tissue in topical preparations. Thereafter Brajakagni or Bhrajaka Pitta starts its Pachana (process of digestion). The viable epidermis initiates the catabolic breakdown of the absorbed substance by using necessary enzymes. The aforesaid transformation may result in the synthesis of some new metabolites that calm the inflamed Dosha locally, interrupting the pathogenesis cycle and relieving symptoms.

CONCLUSION

The non-union of fractures has been observed as one of the common complications nowadays. Without undergoing any surgery, the patient's quality of life and motor function considerably improved. In this case study, the patient's discomfort, range of motion, and strength all significantly improved within 15 days of treatment. Two months later, the patient experienced nearly total pain relief and was able to carry out daily tasks involving the right arm. The X-ray revealed that the fracture had healed completely and was united.

Patient Perspective: I feel better after the completion of treatment with relief in pain, weakness, and stiffness in my right hand. Overall, I am happy and satisfied with the treatment.

Declaration of Patient Consent: The patient provided informed consent for the case report to be published, and she was aware that her personal details would remain anonymous.

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