

MULTILEVEL SOFT TISSUE WITH BONY CORRECTIVE SURGERY IN LOWER LIMB DEFORMITIES AS ONE SITTING PROCEDURE IN SPASTIC CEREBRAL PALSY: AN EXPERIENCE FROM FREE DISABLED SURGICAL CAMPS

Antony R. Benn¹, K. S. Bajpai², Atul Manoharrao Deshkar³, Bhanu Pratap Singh⁴, Archana Singh⁵, Vibha Dhruv⁶, Himanshu Sharma⁷, Santosh Uddesh⁸

HOW TO CITE THIS ARTICLE:

Antony R. Benn, K. S. Bajpai, Atul Manoharrao Deshkar, Bhanu Pratap Singh, Archana Singh, Vibha Dhruv, Himanshu Sharma, Santosh Uddesh. "Multilevel Soft Tissue with Bony Corrective Surgery in Lower Limb Deformities as One Sitting Procedure in Spastic Cerebral Palsy: An Experience from Free Disabled Surgical Camps". Journal of Evolution of Medical and Dental Sciences 2015; Vol.4, Issue 49, June 18; Page: 8454-8460, DOI: 10.14260/jemds/2015/1226

ABSTRACT: The study was intended to assess the results of multilevel soft tissue with bony corrective surgery as one sitting procedure on static deformities and contractures in lower limbs with patients of spastic cerebral palsy at free disabled surgical camps at Chhattisgarh state. In our study 30 patients were included with sixty percent male and forty percent female, within 4-16 years age group. Almost all patients had diplegia and only few patients had quadriplegia with grade 3 power in both upper limbs. Improvement in functional ability and locomotion of all operated patients were assessed by gross motor functional classification scale and with physical examination. Almost all patients who were operated in our study showed significant improvement in functional abilities and locomotion after surgery. All patients were maintaining functional abilities at follow up duration of 2 years (24 months), with 70% excellent cases gait of patient were normal or mild spastic but they were walking without support, with 20% good cases gait of patients were spastic but patients comfortably walk with short knee braces and with 10% fair cases gait of patients were scissors but patients walked comfortably with long knee braces. Our study shows that, promising results can be obtained in spastic cerebral palsy patients with static deformities and contractures of joints in lower limbs with multilevel soft tissue and bony corrective surgery. We believe that it's a team effort of the surgeon, paramedical and rehabilitation staff in postoperative period for the achievement of better results.

KEYWORDS: Cerebral Palsy, corrective surgeries.

INTRODUCTION: Drugs used by quacks in first trimester of pregnancy and misuse of oxytocin seems to be one of the major causes of cerebral palsy in India. Untreated pregnancy induced hypertension, toxemia of pregnancy Asphyxia and cerebral palsy due to difficult labour and forceps delivery, lack of proper health services are other causes. Around ten percent of the population in our country is disabled,¹ and cerebral palsy alone is the cause amongst thirty percent of the disabled. Many times the definition and classification of cerebral palsy was reviewed by different committee.² About 70 to 80 percent of affected individuals have spastic cerebral palsy. In spastic CP, muscles are stiff, making movement difficult, ataxic and mixed are other variety.³

The non-operative management of spastic cerebral palsy involving the lower limb deformities includes physiotherapy like stretching, joint range of motion, neuro developmental therapy, serial corrective cast application, oral anti spastic medicines and management of focal spasticity with injections like phenol, alcohol, botulinum. These non-surgical management may not be helpful in cases of static deformities of lower limb with spastic cerebral palsy, which needs multilevel soft

ORIGINAL ARTICLE

tissue with bony corrective surgery as and when required. It not only corrects the deformities but also improves personal hygiene, gait and independent ambulation with assistive devices only or with orthotics.

One time multilevel soft tissue with bony corrective surgery (Where it's needed) is done in lower limb deformities of children with spastic cerebral palsy to improve the gait of patient. This treatment should be planned with patient needs.

This retrospective study of 30 patients with spastic cerebral palsy with deformities of lower limbs were operated in free disabled surgical camps at different district of Chhattisgarh state in institutions with help of NGO's, Akhil Bhartiya Viklang Chetna Pairishad, Govt. agencies and life line express, to improve personal hygiene, gait and alone ambulation with assistive devices only or with orthotics.

MATERIALS & METHODS: In our study 30 patients were included with sixty percent male and forty percent female with 4-16 years age group (0-5 yrs-25%, 6-10 yrs. -40%, 11-15 yrs. -30%, 16 & above-5%) The study extended from 1st May 2004 to 30th April 2007 (36 months).

Patient were admitted and operated at different free disabled surgical camps in different institutions in different districts of Chhattisgarh state over the period of 3 yrs (1st may 2004 to 31st may 2007).

Choice of patients were with mild to moderate illness, standing or walking with some or the other gait with or without support, patients had good trunkal balance and good muscle power in both upper limb (at least grade 3 in quadriplegics) without spinal deformities. Intelligence quotient test (I.Q test) was done for all patients before surgery, by psychologist.^{4,5} Fifteen patients had their intelligence quotient (I.Q.) in normal range (I.Q.>80). Rest of the patients had mental retardation of various severity, borderline in 10 patients, mild in 3 patients and moderate in 2 patients.

Deformities and conditions of lower limbs of patients were assessed with physical examination at the time of admission for surgery. Deformities like flexion and adduction contracture of hip, flexion contracture of knee joint, equinus, varus, valgus and cavus deformities of ankle and foot, and gait patterns were noted in all the patients clinically.

One time multilevel soft tissue release with, bony corrective surgeries according to patients, were performed in our study. No surgery was performed in bedridden patients with severe deformities and profound mental retardation (non-trainable patients). Exceptionally adductor tenotomy can be done to facilitate nursing care of these type of patients.

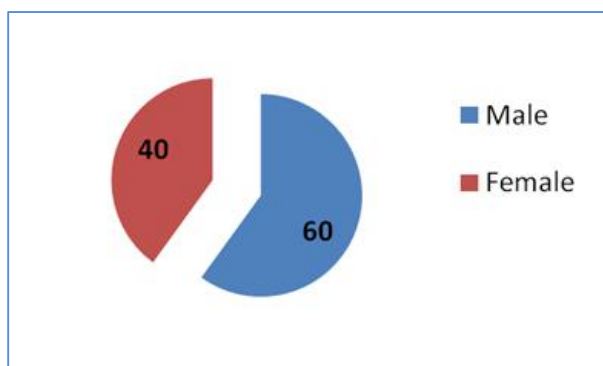


Fig. 1: A Pie Chart showing distribution of male and females in study

ORIGINAL ARTICLE

OPERATIVE PROCEDURES: Dynamic components were addressed with spasticity management and appropriate muscle and tendon procedures in soft tissue surgery. The static components are treated with bony procedures, including various osteotomies and arthrodesis, incorporating biomechanical principles as bony corrective surgery.⁶ One time multilevel soft tissue release with bony corrective surgery were performed in our study.

SOFT TISSUE SURGERY:

1. For hip flexion contractures; flexor muscle of hip joint (psoas and rectus femoris) were released, if deep fascia and Sartorius muscle found tight they were also released.
2. For adductor contractures of hip joint; adductor brevis released from most medial end in upper part of thigh. In case of severe muscle spasm, old patients and with case of recurrence, adductor tenotomy with obturator neurectomy can be done for excellent results.
3. For knee joint flexion contracture; release of hamstring muscle at posteromedial and posterolateral at lower third of thigh, pinhole or open tenotomy was performed (Fractional lengthening).
4. For equines foot; tendoachillis lengthening (pin hole or z plasty) was performed.
5. For cavus foot; planter tendon release (Steindlars) was performed.



Fig. 2: Tarsal Wedge Osteotomy for Varus and Valgus correction and Metatarsal Osteotomy to correct arches of the foot

BONY CORRECTIVE SURGERY:

1. Supracondylar osteotomy: For flexion contracture of knee joint present even after soft tissue release surgery and in older patient's supracondylar osteotomy was done.
Advantages: Full correction achieved, Joint becomes more stable, No recurrence due to 5^o recurvatum of knee joint, No neurovascular deficit
2. Ankle arthrodesis – to make foot stable and plantigrade
3. Tarsal wedge osteotomy - for severe varus and valgus deformity correction of foot
4. Metatarsal wedge osteotomy -for correction of arch deformities of foot.

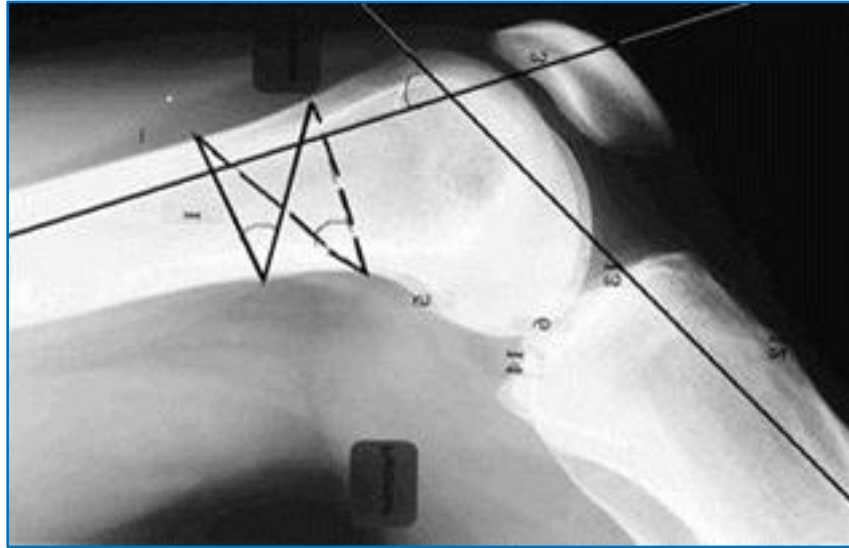


Fig. 3

POSTOPERATIVE PROTOCOLS: After only soft tissue release surgery, corrective pop slab from toe to groin with compression bandage over wound site was applied. After 10 to 12 post-operative days stitches were removed and patient was sent home with toe to groin pop cast in one limb operated cases, but in both limb operated cases bilateral toe to groin cast with supporting bar was applied. Patients were advised rest with analgesics, antibiotics, symptomatic and supportive medicines and were called after one and a half months, when cast was removed and physiotherapy of limbs started and measurement for orthotics were given. Then patients were trained for walking with or without assistive tools (Long leg knee brace, limited motion knee brace, brace with padded wooden bars, hip support light weight brace, firm sole shoes, crutches, calipers, walkers and parallel bars).

After soft tissue as well as bony corrective surgery (SCO, ankle arthrodesis, wedge correction of foot), above knee pop cast was applied at the time of surgery with knee joint 5-10° flexion.

For equines deformity correction cases above knee pop cast applied at the time of surgery with 5-10° knee joint flexion and ankle joint about 5° dorsiflexion.

After removal of sutures on 10-12 postoperative day, bony corrective surgery cases were discharged with above knee pop cast, with analgesics, antibiotics, symptomatic and supportive medicines and advised to review after 2 months. At the time of review of bony corrective surgery patients, check x rays were done to see the bony union. Then plaster cast was removed and physiotherapy for joint movements started with hot fomentation and gradual passive range of motion with or without equipment's, then same protocol was applied as soft tissue surgery cases and patients were called for follow up every month at least for 2 years.

OBSERVATION AND RESULTS: In our study all patients has static deformities in the lower limbs with spastic cerebral palsy, most of the cases were diplegic and few were quadriplegic. Ten percent cases were lost for subsequent follow up. Gait⁷ and walking analysis was done and were graded as excellent, Good and Fair.

ORIGINAL ARTICLE

Results	No. of cases in percentage	Post-Op. Complaints & Soakage	Gait and Walking
Excellent	70%	NIL	Normal/ Mild Spastic (Patient walks without support)
Good	20%	Minimal (Superficial infection)	Spastic Gait (Patient walks with short knee brace)
Fair	10%	Minimal (Mild recurrence flexion contracture of knee joint)	Scissor Gait (Patient walks with long knee brace)

Table. 1

- Results were excellent in 70% cases, where post-operative complications were nil, gait of patient was normal or mildly spastic, but they were walking without support.
- Results were good in 20 % cases, where postoperative complications were minimal like superficial infection in 3 cases, which was treated with antibiotics. Gait of patients were spastic, but patients comfortably walked with short knee brace.

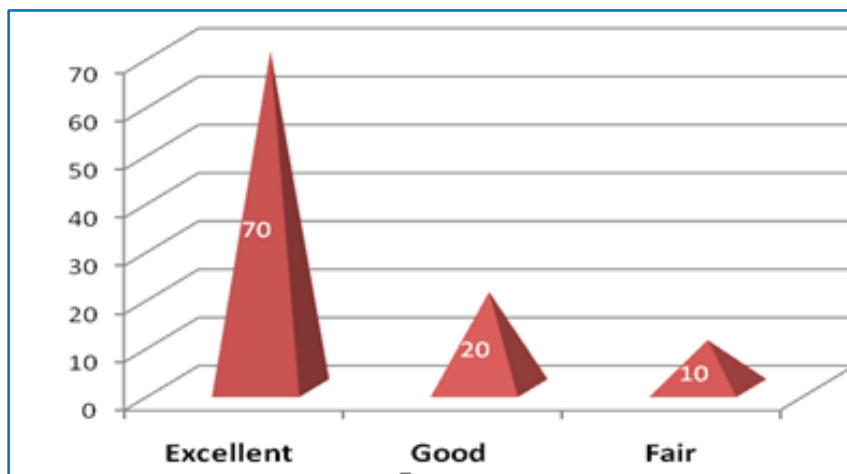


Fig. 4: Chart showing analysis of outcome in percentage on basis of timeframe of bone union, postoperative complaints, walking and gait

- Results were fair in 10% cases, where post-operative complications were minimal with mild recurrence of flexion contracture of knee joint in 2 cases. Patients were treated with brace/ corrective pop cast, gait of patients were scissors but patients walked comfortably with long knee brace.

DISCUSSION: With one time multilevel soft tissue with bony corrective surgeries, in patients of spastic cerebral palsy with lower limb deformities and contractures of joints, results were better for locomotion of patients. Single event multi-level orthopedic surgery is a well-established procedure in the management of spastic cerebral palsy. This concept of surgery along with well-structured therapy program gives rise to desired results in most of the properly selected patients with fixed contracture. In most of the cases, only selective spasticity controls by soft tissue balancing surgery (OSSCS) suffice to give good outcome.⁸

ORIGINAL ARTICLE

Gupta et al (2008) suggested that CP patients with good trunk control and static contractures at multiple joints in the lower limbs can be made ambulant with single-stage multilevel soft-tissue surgery.⁹ In the developing state like Chhattisgarh we believe that incorporation of pain parameters, quality of life, and psychosocial parameters are highly relevant in surgical treatment of children with cerebral palsy.¹⁰ The parents of these patients are mostly illiterate and poor, with lack of health care facilities in villages of Chhattisgarh are unable to come for multiple stages of surgery and follow up. This one time surgical procedure in free disabled surgical camps at different district of Chhattisgarh is cost effective, less time consuming and logical.

We recommend these types of one sitting surgeries as it had minimal complications, with significant improvement of functional ability in most of the cases.

We are thankful to Dean CIMS Bilaspur and acknowledge the contribution of Dr. G L Arora Akhil Bhartiya Viklang Chetna Parishad, Indian Medical Association, Life Line Express of Govt. of Chhattisgarh Department of Health and Family Welfare.



Fig. 5: Post-Operative with calipers and shoes

REFERENCES:

1. Disability Statistics: Facts & Statistics on Disabilities & Disability Issues: www.disabled-world.com Retrieved on 20 May 2015.
2. Rosenbaum, P; Paneth, N; Leviton, A; Goldstein, M; Bax, M; Damiano, D; Dan, B; Jacobsson, B (2007). "A report: The definition and classification of cerebral palsy April 2006". *Developmental medicine and child neurology*. Supplement 109: 8–14.
3. Panteliadis, C; Panteliadis, P; Vassilyadi, F (Apr 2013). "Hallmarks in the history of cerebral palsy: from antiquity to mid-20th century." *Brain & development* 35 (4): 285–92.
4. Malhotra S. In *Child Psychiatry in India: An approach to assessment and management of childhood psychiatric disorders*. Pub. Macmillan; 2002. Temperament Measurement Schedule; pp. 104–13.
5. Malhotra S. A parental handling questionnaire. *Indian J Psychiatry*. 1990; 32: 265–72.
6. Aiona, Michael D.; Sussman, Michael D. Treatment of spastic diplegia in patients with cerebral palsy: Part II *Journal of Pediatric Orthopaedics B*: May 2004 - Volume 13 - Issue 3 - pp S13-S38
7. Sutherland, DH. (2002). *The evolution of clinical gait analysis: Part II Kinematics Gait & Posture*. 16: 159-179.

ORIGINAL ARTICLE

8. Jain J, Jain V, Shrivastav V. Single event multi-level orthopedic surgery in a teenager having spastic triplegic cerebral palsy. *Indian J Cereb Palsy* 2015;1: 45-8.
9. Anupam Gupta, Abhishek Srivastava, Arun B Taly, 1 and Thyloth Murali: Single-stage multilevel soft-tissue surgery in the lower limbs with spastic cerebral palsy: Experience from a rehabilitation unit *Indian J Orthop.* 2008 Oct-Dec; 42(4): 448–453.
10. Per Reidar Høiness, Hilde Capjon, and Bjørn Lofterød: Pain and rehabilitation problems after single-event multilevel surgery including bony foot surgery in cerebral palsy *Acta Orthop.* 2014 Dec; 85(6): 646–651.

AUTHORS:

1. Antony R. Benn
2. K. S. Bajpai
3. Atul Manoharrao Deshkar
4. Bhanu Pratap Singh
5. Archana Singh
6. Vibha Dhruv
7. Himanshu Sharma
8. Santosh Uddesh

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Orthopaedic, Government Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh.
2. Consultant Orthopedic Surgeon and Block Medical Officer, District Hospital, Baloda Bazar, Chhattisgarh.
3. Associate Professor and HOD, Department of Physiology, Government CIMS, Bilaspur, Chhattisgarh.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

4. Associate Professor, Department of Pathology, Government CIMS, Bilaspur, Chhattisgarh.
5. Associate Professor, Department of Radio Diagnosis, Government CIMS, Bilaspur, Chhattisgarh.
6. Associate Professor, Department of Radiotherapy, Government CIMS, Bilaspur.
7. Assistant Professor, Department of Orthopedics, Government CIMS, Bilaspur.
8. Associate Professor, Department of Surgery, Government CIMS, Bilaspur.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Atul Manoharrao Deshkar,
Associate Professor and HOD,
Department of Physiology,
Government Chhattisgarh Institute of
Medical Sciences, Bilaspur- 495001,
Chhattisgarh.
E-mail: dratuldeshkar@gmail.com

Date of Submission: 31/05/2015.
Date of Peer Review: 01/06/2015.
Date of Acceptance: 10/06/2015.
Date of Publishing: 16/06/2015.