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Pavankumar Kohli

Professors, Department of
Orthopedics, BKL Walawalkar
Hospital, Ratnagiri,
Maharashtra, India

Sunil Nadkarni

Professors, Department of
Orthopedics, BKL Walawalkar
Hospital, Ratnagiri,
Maharashtra, India

Sushant Chavan

Professors, Department of
Orthopedics, BKL Walawalkar
Hospital, Ratnagiri,
Maharashtra, India

Ankush Nawale

Fellow in Spine Surgery,
Dept. of Orthopaedics, BKL
Walawalkar Medical College,
Dervan, Chiplun, Ratnagiri,
Maharashtra, India

Poorv Patel

Dept. of Orthopaedics, BKL
Walawalkar Medical College,
Dervan, Chiplun, Ratnagiri,
Maharashtra, India

Ashok Mali

Dept. of Orthopaedics, BKL
Walawalkar Medical College,
Dervan, Chiplun, Ratnagiri,
Maharashtra, India

Satishchandra Gore

Professors, Department of
Orthopedics, BKL Walawalkar
Hospital, Ratnagiri,
Maharashtra, India

Correspondence

Sunil Nadkarni

Professors, Department of
Orthopedics, BKL Walawalkar
Hospital, Ratnagiri,
Maharashtra, India

Dervan simultaneous surgical protocol complete relief of lower limb neuralgic & arthritic pain

**Pavankumar Kohli, Sunil Nadkarni, Sushant Chavan, Ankush Nawale,
Poorv Patel, Ashok Mali and Satishchandra Gore**

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Abstract

Introduction: Surgery has made tremendous advances in the fields of joint Arthroplasty & Spine. Major advances in both these fields have made patient care more nature friendly & less morbid, thus allowing smaller incisions, day care procedures like endoscopic spine surgeries, minimally invasive joint replacement and so on. However, both these specialties have remained diverse and separate. Thus, in the typical modern-day specialty-based practice era, a patient consulting an Arthroplasty surgeon will seldom have a detailed spine examination or vice versa. This may lead to scenarios where the pain generator is from for example radiculopathy to the knee and below & the recommended procedure is a joint replacement due to incidental wear of the joints seen on the X ray. (1) The international data shows that there are 20% dissatisfied arthroplasty patients worldwide. (2) We have found concomitant knee & spine pathologies in more than 90% of our patients & published our research on the same topic. (1, 3, 4, 5) Thus the need arises for taking care of both pain generators i.e. from the spinal stenosis (central & or lateral) & knee arthritis for complete pain relief to the lower limbs. The developed protocol is the first of its kind for a more Holistic diagnosis & treatment of lower limb pain. It also saves interval dissatisfaction of the patient, healthcare costs & is a step towards a more team based surgical care between specialized spine & arthroplasty surgeons. Specialization should no more be a cause of separation between treating surgical teams & continued pain for the patient. A more Holistic clinical & surgical approach is hereby proposed.

Methods: In this pilot study, twenty two patients were selected who underwent simultaneous & single sitting surgical treatment for leg pain, unilateral or bilateral. After detailed clinical examination & imaging studies, Simultaneous, Single stage Surgery was carried out in needy patients. Step one was Transforaminal Endoscopic Lumbar discectomy of the L4-5 disc in 17 patients, 2 level L3-4 & L4-5 in 3 patients & L5-S1 in 2 patients under local anesthesia in an awake & aware patient. After completion of the Percutaneous Endoscopic Lumbar Discectomy, an epidural catheter was inserted through the endoscope under vision in the epidural space by the spine surgeon (Dr. Sunil Nadkarni) & patient turned supine after checking the position of the catheter with radiolucent dye & securing the catheter. The anesthetist pushed the drug, patient was turned supine and painting & draping was done to begin the second part of the procedure i.e. single side or bilateral unicondylar joint replacement.

Results: Results were classified by VAS, ODI, Oxford knee score, SF 12 before & after the procedure.

Conclusion: The proposed "Dervan Simultaneous Surgical protocol "for Lower Limb pain, is a satisfying procedure with good to excellent outcomes in more than 90% patients. It provides the way for a holistic patient centered approach to treating all the main pain generators of the lower limb in one sitting. It is time saving & cost effective. Rehabilitation can start for the entire physiological neuromuscular unit and provide more holistic therapy.

Keywords: spine endoscopy, knee arthroplasty, simultaneous surgery, dermatome, holistic approach

Introduction

Lower limb pain has been an enigma for long. The exact cause of pain, the origin of the main pain generator has confused many an astute clinician. To confuse matters more, coexistence of the pain generator in both knee joints & spine is often noted [1-4]. The surgeons practicing specialized knee Arthroplasty are often faced with dissatisfied patients complaining of lingering pain in the knee, often behind the knee [5, 6]. We clinicians are aware that the site of pain is not necessarily the source of pain.

It is only on closer questioning that they will reveal that the pain is not exactly on the joint line

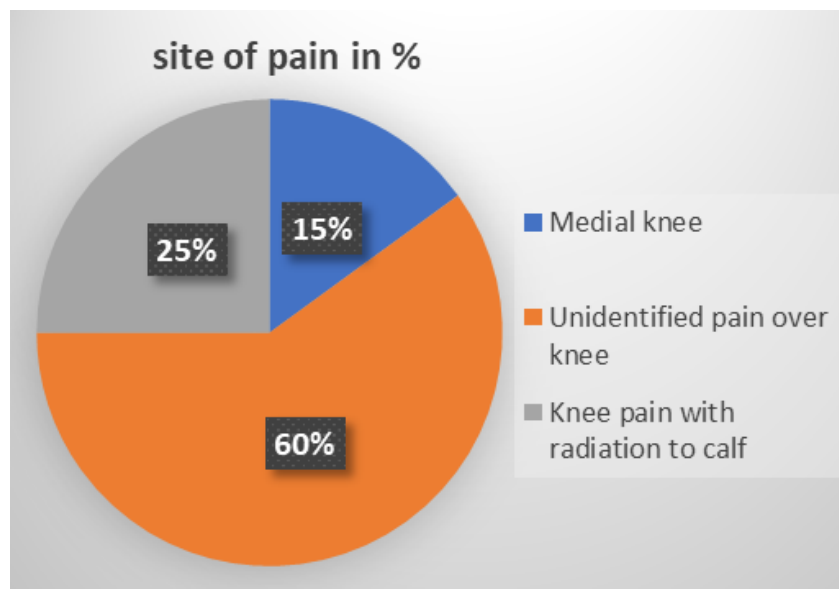
as before but behind the knee or more on the lateral side, going to the calf. The “Umbrella term” of knee pain is to blame for this and the patient’s forgivable lack of anatomy & possible pain generators. If the clinician is at fault it may be only for not identifying All the possible causes of the ‘Umbrella term ‘knee pain before the surgery & counselling on the rehabilitation, possibility of need of surgery at Spine as a contributor to the perceived pain Around the knee, preoperatively. Considering the frequent coexistence of pain generators at the Spine in form of central/lateral canal stenosis & Arthritis of the knee, we have developed a surgical protocol for Simultaneous, Single sitting complete relief of lower limb pain. Not only are all the pain generators tackled at a single shot, Rehabilitation is easier & Holistic, the patient & Healthcare system saves considerably by the single admission and prevention of repetition in drugs etc. Not only are Skill & Logistics considered in this protocol, the surgeries are also performed in the most Nature friendly way with all Minimally Invasive Surgery based principles, enabling quick return to activity. None of our patients have been mobilized later than 12 hours postop after the simultaneous spine & joints surgery or have gone home later than 3/4 days postop.

There the need to consider anesthetic risks and make the surgery not just efficient & single sitting but also SAFE, as all patients were senior citizens with co morbidities. To our knowledge, this is the first described surgical protocol for simultaneous addressal of all common pain generators to the lower limb.

Methods

This Pilot study was carried out in 22 patients. All patients were selected from a cohort of opd patients attending a Joint care & Arthroplasty center. The primary presenting complaint in all patients was pain around the knee. Of the 60 patients who attended the OPD for knee pain, closer questioning revealed, pain only on the medial side was 15% i.e. 9 patients, undefined pain over the anterior knee with medial knee pain was 60% i.e. 36 patients, Pain over knee along with pain at the back of knee & calf was 25% i.e. 15 patients.

Sr.	Site of pain	Patient number	Percentage
1	Medial knee	9	15
2	Unidentified pain over knee	36	60
3	Knee pain with radiation to calf	15	25



All patients were investigated radiologically with standing views of Radiograph of both knees, along with standing Radiograph of Lumbosacral spine in Lateral. All those with possible surgical intervention were further advised MRI of LS Spine with scout view of whole spine.

Of the above 60 patients 42 showed radiological damage to the medial condyle/both condyles.

32 patients out of 42 showed primarily medial condyle affliction. 10 patients had bicondylar/tricompartmental osteoarthritis. Two of the 10 patients with tricompartmental disease had signs of inflammatory joint disease.

Patients were counselled according to their clinical signs; radiological correlation & consent was taken along with verification of understanding of full spectrum of the disease & its treatment both in the disc space & joint contributing to lower limb pain.

22 patients consented for Simultaneous Surgery Protocol, the

others were put on surgical waiting list of staged surgeries & or Rehabilitation (20 patients).

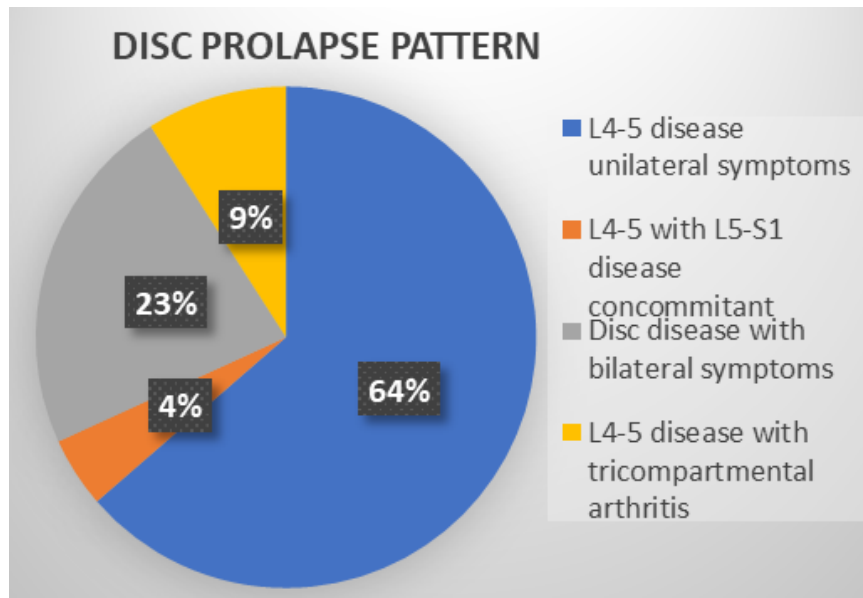
Of the above 22.

14 had primarily symptomatic L4-5 disc prolapse on the symptomatic leg side.

5 patients had bilateral leg symptoms with confirmed radiological signs on radiograph of Unicondylar knee arthritis 2 patients had L 4-5 prolapsed disc affection with unilateral tricompartmental arthritis.

1 patient had two level prolapsed discs L4-5, L5-S1 with bilateral unicompartmental disease.

Total Patients	22
L4-5 disease unilateral symptoms	14
L4-5 with L5-S1 disease concomitant	1
Disc disease with bilateral symptoms	5
L4-5 disease with tricompartmental arthritis	2



Patient selection: Although patients complained primarily of knee pain, or pain around the knee, each was carefully examined by proper mapping of pain, sensory and or motor dermatomes affected, radiological studies like standing views of Knees, standing views of spine especially lateral in flexion & extension. MRI's were not taken as the final decision maker tool, rather just an aid to confirm clinical findings along with pain dermatome distribution. MRI was also use as an important tool to plan entry, location of fragment & areas to be addressed in the spine endoscopy.

The newly described Dervan Rim Sign was an important tool to note non bone on bone medial compartment arthritis and explain cause of non-bone on bone contact arthritic pain [7].

Counselling, planning & explaining surgical protocol, Rehabilitation as per the Dervan Protocol [8].

Surgical Protocol was planned as per symptoms, evaluation & Radiological imaging [9].

It is pertinent that All Surgeries Were in Awake & Aware State, All Knee Surgeries Were Minimally Invasive; All Post-Operative Mobilisations Was First Aimed For Within 7-8 Hours of Surgery.

Surgical Protocol

1. Patient is positioned prone on the OT table.
2. Marking of the level of endoscopic surgery is done with aid of the C Arm Image intensifier, of the relevant surgical level. Patient is Awake & Aware At All Times.
3. This paper does not include fine points of needle placement & entry for which papers from the senior contributors of this publication may be referred to. (Dr. S Gore, Dr. S Nadkarni).
Fine modifications are made as to the trajectory of the needle & bevel orientation till satisfactory entry to the affected disc space is gained, as verified by the C Arm.
4. Further steps of the Transforaminal endoscopic discectomy proceed with replacement of the cannulated needle with the guide wire, Threading of the dilator over the guide wire, Insertion of the sheath over the dilator &

the insertion of Endoscope with irrigation.

5. Further surgical steps of procedure follow annulotomy & Discectomy with verification of decompression of relevant areas e.g. exiting root, tip of superior articular process etc.
6. Important Step: An epidural catheter is then held with an endoscopic disc forceps & gently guided into the cleared epidural space.
7. 3-4 cc of radiopaque dye (omnipaque) is pushed into the catheter to verify the location & smooth delivery of the fluid.
8. Epidural dose is injected as per the instructions of the anaesthetist.
9. Platelet Rich Fibrin Plug (Dervan Plug) is inserted at the discectomy site as per our standard protocol for Transforaminal endoscopic surgeries [10].
10. Cannula is removed & the Epidural catheter is fixed to the skin.
11. Patient is turned supine & positioned for Knee surgery after verification of lower limb anesthesia.
12. Unicondylar or Total knee replacement, of one or both knees is carried out as per plan by minimally invasive techniques.

Rehabilitation Protocol

Patients are mobilized within 7-8 hours of the surgery as per The Dervan mobilization protocol [8].

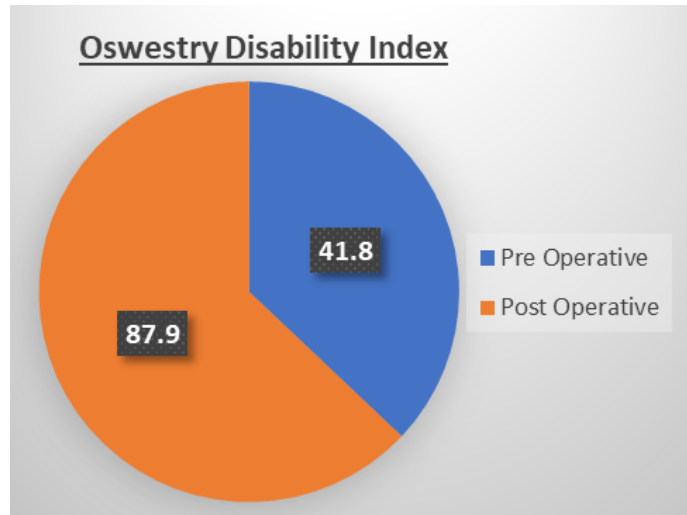
Patients are discharged on day 3 or 4 after stair climbing & independent control of daily living ergonomics.

Results

Pre & postoperative results of all patients were calibrated at 3 months by

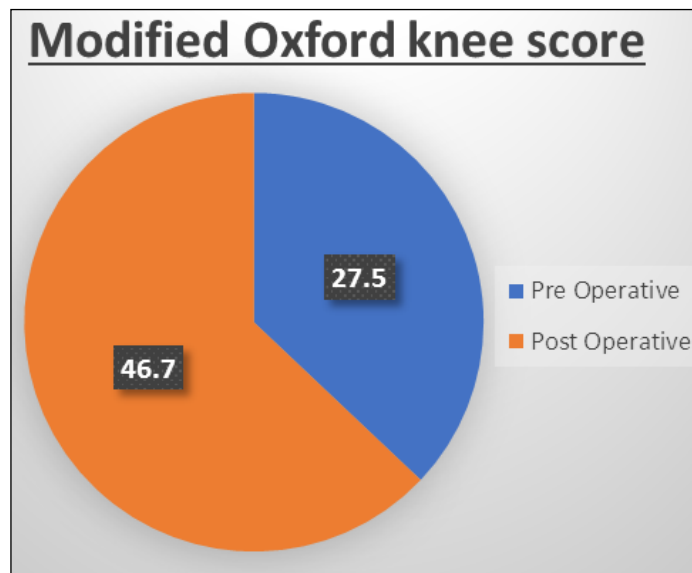
Oswestry disability index

Pre	41.8%
Post	87.9%



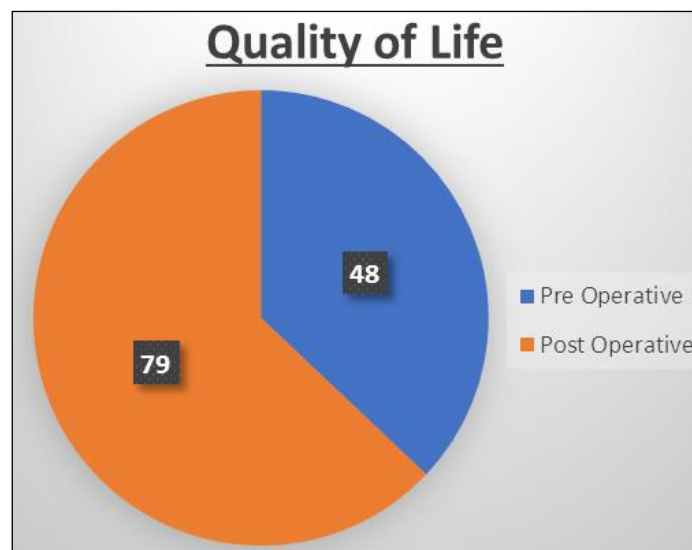
Modified Oxford knee score

Pre 27.5
Post 46.7



Quality of Life by SF 12

Pre 48
Post 79



Two patients of the total 22 complained of recurrence of lateral side knee pain radiating to the Lower 3rd of the leg at the first review at stitch removal on 14th day. They were evaluated & corrected in the faulty ergonomic technique in activities of daily living. Both improved within 2-3 days. Incidentally both these patients were obese, had poor core stability & had overlooked the advice of wearing a Lumbosacral belt during mobilization till adequate control of the core was gained. There were no other complications.

Cost savings on account of simultaneous surgery was

Cost of rehospitalization for 4 days: Rs 14,000
Cost of repeat medication (Antibiotics, NSAIDS, Anesthetic drugs): Rs 23,000
Continued disability costs to patient: Incalculable
Cost of time & repeat load on Healthcare personnel: Incalculable
Average minimum cost savings to patient were Rs 37,000 which formed approximately 30% of the hospital expenses sans medical fees & care for 3-4 days.
Continued pain & suffering, physical & psychological costs to both patient & doctor cannot unfortunately be calculated.

Pre-Op Photos



Discussion

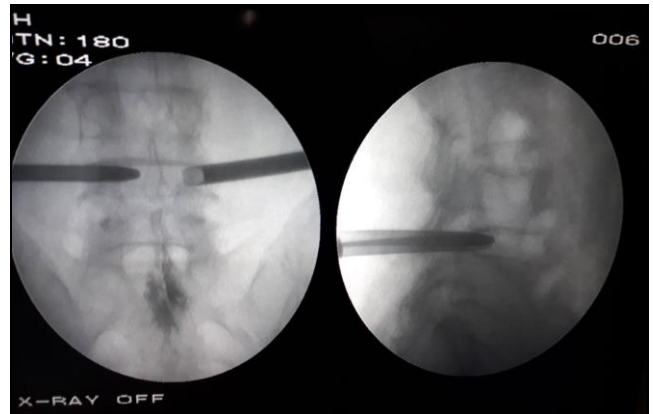
Pre-Operative X-ray of knee joint



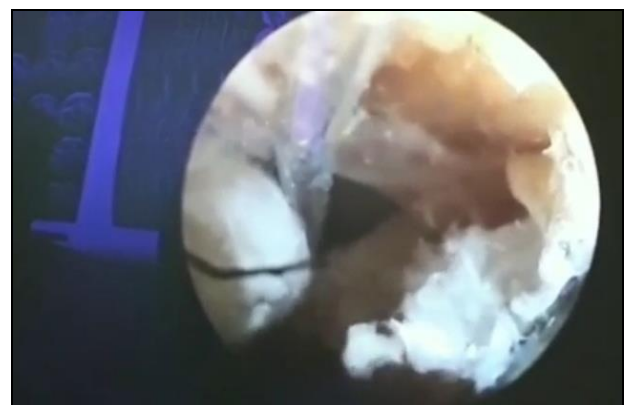
Pre-Operative MRI of LS Spine



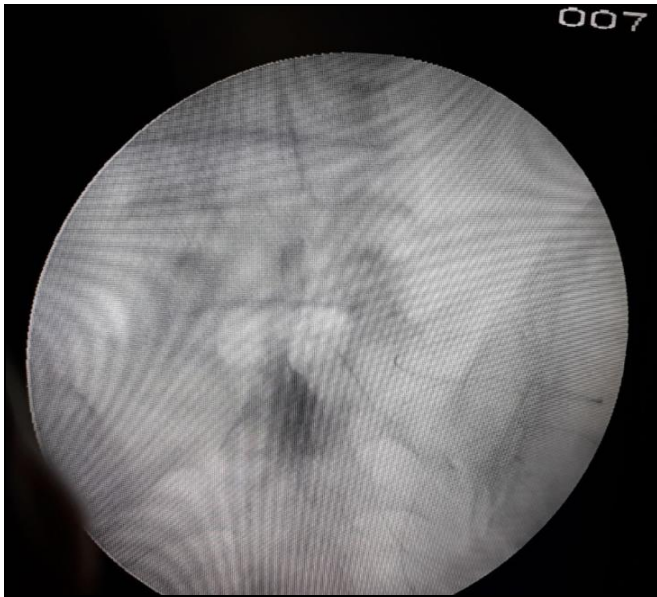
Pre-operative position and markings



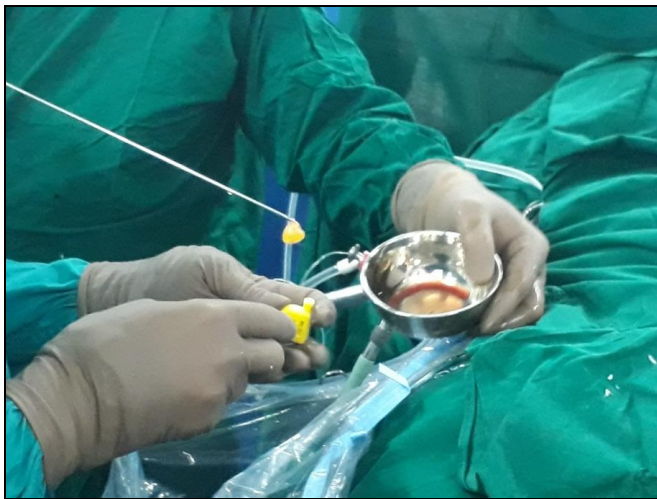
C arm guided endoscopic discectomy



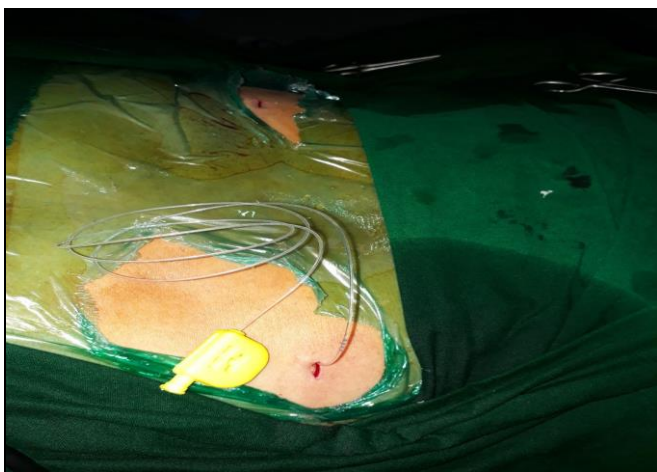
Epidural catheterization through endoscope



Confirmation of epidural space with dye



Platelets rich fibrin plug passage in disc space (PRF)



Epidural Cathedral



Positioning of knee for unicondylar knee replacement



Unicondylar Knee intraOp



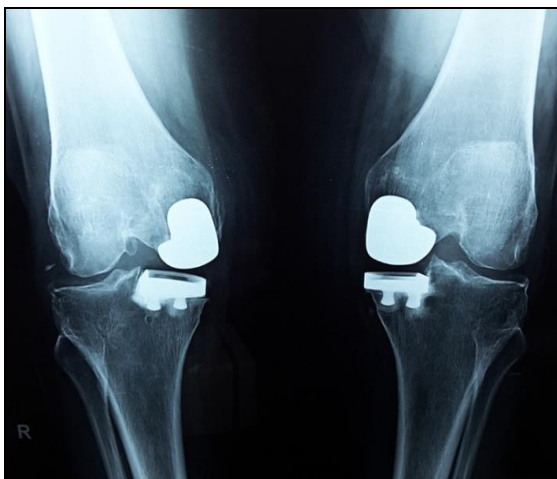
Post-operative Incision Size for endoscopic spine & Unicondylar knee



Post-Operative Incision Size



Post-Operative X Ray



Squatting on post-operative day 12

Discussion

The primary center of development of this protocol is a Tertiary care rural hospital in coastal India. Authors number 7 & 2 were the first to pioneer the technique of Transforaminal endoscopic surgery in India [6]. Valuable results were obtained with quick recovery in an awake & aware patient as the best form of biofeedback intraoperatively. Patient satisfaction was extremely high.

Osteoarthritis is a common malady & with increasing life expectancy, the above Tertiary center is amongst the first to pioneer the use of Unicompartmental knee replacements as the 'Natural Knee Replacement' most suitable for Asiatic lifestyle. It is more functional allowing squatting, sitting cross legged, has longer survival & is more cost effective with faster recovery, lessor hospital stay etc. [11-15].

In a previous publication from this institute, on investigation of causes of dissatisfied patients of knee Arthroplasty, it was found that although the patient complained of pain around the knee, the source & pain generator were mostly from the spine¹. It was thereafter made mandatory for all patients of knee osteoarthritis to undergo spine investigations & detailed clinical examination preoperatively. Furthermore it was found that great concomitant affliction existed between spinal disc disease & knee Osteoarthritis [1].

Both lead to pain around the Knee.

Hence a more Holistic approach was developed where the patient was not examined separately by super specialty but holistically from all clinical points of view. This Holistic approach extends to all phases of treatment i.e. clinical examination, counseling, physiotherapy, staged or Simultaneous surgical approach & postop Rehabilitation. Not only is the patient more knowledgeable and responsible but also more committed & less litigious. The Surgeon has a broader view of the patient's condition & is able to advise more appropriately as to possible options of treatment, their sequence & expectations.

Cost savings, Ease of rehabilitation, Skill development, Propagation of a holistic attitude to patient care & a deeper understanding of the integrated functioning of the human body are promoted [2]. Specialization need not lead to separation. In fact it is felt by those of us fortunate enough to serve at this center that, Holistic approach is the need of the hour ...as a specialization in itself.

Conclusion

The Dervan Surgical Protocol for simultaneous surgery of spine & knee is a minimally invasive, beneficial & effective technique for complete treatment of the commonly occurring clinical pain around the knee, addressing pain generators from both spine & knee. It can be useful in many select situations. Practical implications of healthcare cost & time saving along with complete long term relief to the patient are valuable inputs of this surgery.

The time has probably come when instead of Spine or Arthroplasty surgeons, there can be a trained section of new 'Dermatome surgeons' who can treat all causes of pain in that dermatome, whether from spine or joints Holistically & with easy skill.

Acknowledgements

This is a pilot study involving 22 patients. Although the quantum & speed of relief of common pain generators of knee pain are addressed in a single sitting, the surgeries for both areas was carried out by surgeons with large experience on both respective fields. It remains to be seen with larger studies done elsewhere whether same results are capable of being reproduced.

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