THE ISSUE OF IMPLANTS FOR SPINAL FUSION IS IT OVERSUBSCRIBED

(Reference: - PLIF)
Dr. P.S. Ramani
Consultant Neuro & Spinal Surgeon
UNINSTRUMENTED PLIF

- It is a safe and effective procedure.
- Has stood the test of time.
- Long term results are available.
- Should not be abandoned in favour of instrumentation.
P.L.I.F.

- I am one of the original proponents.
- It is gratifying to witness continuing interest in this operation.
- I have done 1000 P.L.I.Fs till
TRADITIONAL PLIF

- Depends entirely on Osteosynthesis of Bone Graft within the Disc Space.
- The concept is physiological and should be encouraged.
Disrupted Spine Corrected by PLIF
DYNAMIC X-RAYS AT 2 YEARS

EXTENSION

NEUTRAL

FLEXION
Solid Bony Fusion at 2 years
Solid Bony Fusion at 2 years
STUDY OF FUSION

4 MONTHS
STUDY OF FUSION

8 MONTHS
STUDY OF FUSION

12 MONTHS
STUDY OF FUSION

24 MONTHS
CORRECTION OF FAILED BACK
CORRECTION OF FAILED BACK
CORRECTION OF FAILED BACK
IMPLANTS

Should be used in selected cases with significant instability.
Clinical results of uninstrumented PLIF are superior when there is good osteosynthesis and solid fusion.

- Three points for good Osteosynthesis are:
  - Stable construct.
  - Large amount of Bone Grafts.
Clinical results 1994 correspondence

- Good: 83%
- Fair: 14%
- Poor: 3%
Clinical Results

- No Job But Pain Relief: 18%
- Pending Compensation: 13%
- Original Hard Job: 56%
- Light Job: 13%

Legend:
- Original Hard Job
- No Job But Pain Relief
- Pending Compensation
- Light Job
MERITS OF PLIF

- In PLIF the Disc Space is emptied of Disc Tissue and filled with Bone Grafts.
- Autologous bone impacted in the Space in high density manner causes good Osteosynthesis.
- BMP added to auto or Allo Bone enhances Osteogenic Potential.
- Wt. Bearing and Lordotic Curvature Cause Microcompression and earlier Osteosynthesis.
THE SPINAL SURGEON

- He should be familiar with both procedures, PLIF with and without instrumentation.
- In recent times, sadly the expertise for uninstrumented PLIF is leaking.
- Instrumented PLIF is technically demanding.
- Young spinal surgeons have difficulty in
P.L.I.F.

- Recent years has seen increased reliance on instrumentation without careful examination of the Relative Merits.

**REGID STABILISATION**

- Greater risk of stress on the Adjoining Segment.

- Etebar and Cahill (1999) showed that in 125 pts with 44.8 months follow-up,
UNINSTRUMENTED v/s INSTRUMENTED PLIF

- Not enough series of instrumented PLIF available to do comparison.
- Fused Uninstrumented PLIF is a Remodelled Vertebral Body.
- It can accurately follow the Wolff’s Law of Form
- Instrumented PLIF cannot Biomechanically follow the Physiological
RAY’S REPORT

- Analysis of 2580 Uninstrumented PLIFs by 13 surgeons: 89% average Fusion Rate in long term follow-up.

- Cloward’s Original Report: Uninstrumented PLIF—1953—96% Fusion rate in 162 cases.
P.L.I.F.

Developed by Dr. Cloward.
PLIF has completed 60 glorious years.
CHAPTER

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Posterior Lumbar Interbody Fusion (PLIF):
Past, Present, and Future

PAUL M. LIN, M.D.
MEMBERS OF CLUB

1. Dr. Horst Blume USA
   (Uni.chip-dowel autograft)
2. Dr. Paul M. Lin USA
   (Preservation of posterior segment)
3. Dr. Miyuki Takeda JAPAN
   (Bicortical autograft)
4. Dr. J. W. Simmons USA
   (Autogenous chip grafts)
5. Dr. P.S. Ramani INDIA
   (Mixed allograft and autograft)
6. Dr. William Duffy USA
   (High density autochips)
MEMBERS OF CLUB

7. Dr. Gabriel Ma USA  
   (Mortising chisel)

8. Dr. Alastair Robson AUSTRALIA  
   (Clowardian technique)

9. Dr. Tomaia Yamamoto JAPAN  
   (Clowardian technique)

10. Dr. John Collis USA  
    (Anterior technique)

11. Dr. Charles Hunter USA  
    (Trapezoid shape Autograft)

12. Dr. John Jackson USA  
    (Dorsal tension band)
PERSONAL EXPERIENCE
(MORE THAN 1000 PLIFSS)

- In majority, Uninstrumented PLIF is adequate.
- Must have adequate training.
- Magnification, illumination and Power Tools help to improve technique.
- BMP enhance Osteogenesis.
CONCLUSIONS

• Uninstrumented PLIF is Effective and Elegant Technique.

• Need good Training.

• The Burden of proof lies with Spinal Surgery Community to demonstrate Superiority of Instrumented PLIF.

• All that is High – Tech is not normally a Replacement to High Technique.
USA survey
1996 - 2001

- Spinal fusion operations up by 77%
- Hip & knee arthroplasty up by 13%

Agency for Health Care Research Jan – 2004
Rationale for Fusion

- Successful arthrodesis
- Prevent Painful movements.
- Correct deformity.
Bone for spinal fusion

- Spinal surgery needs lot of bone.
- There was a time when everything was done with auto bone and good fusion was achieved.
Bone Bank

Dr. Ramani’s bone bank was developed in the department in 1985.
SOLID FUSION IN PLIF
Implants flourished

Last decade of last century saw implants flourishing tremendously and very soon steel implants were replaced by MRI compatible titaneum implants.
INSTRUMENTATION FOR HIGH GRADE INSTABILITY
Indications in the past

- Fractures
- Scoliosis
- Tuberculosis
Present Indications

Significantly expanded.

includes

➢ Degenerative disorders of spine
  (A vast ocean)
Present Indications

75% fusions are done for degenerative disorders.

i. Spondylosis
ii. Disc disorders
iii. Spinal stenosis
iv. Instability

Present Indications

25% fusions
Non degenerative instability

- Trauma
- Tuberculosis
- Scoliosis
- Deformity
In India

- Spinal fusions are expensive
- National health is un-supportive
- Insurance is in infancy
Reasons for increase in fusion rate

- Increased population
- Technological advance
- Improved anaesthesia
- Increased life expectancy
- Benefit of axial imaging of spine
- Bone graft substitutes

Spinal implants

- Annual growth is 18 to 20% following approval by FDA of fusion cages.

Latest addition to fusion

- Discogenic low back pain without sciatica in presence of degenerative changes.
- Controversial as diagnosis is based on discography which itself is a controversial procedure.

Discogenic Pain and Fusion

- Backpain and disc degeneration is universal with ageing.
- Number of potential candidates for fusion is enormous.
Randomized trials suggest benefit from fusion after laminectomy.

Stenosis without instability

Fusion has not produced better results.

Discoidectomy for PLIVD

- Comparative studies suggest no advantage with fusion.

Cervical disc excision and fusion

Growing proportion of cervical disc operations include fusion.

Randomized trials give definite edge for fusion following discoidectomy.

Scvolainew S  – Neurosurgery 1998
Dowd GC J     – Neurosurg 1999
Angevine P.D. – National Survey 1990 – 1999
Spine 2003
Discogenic Pain and Fusion

Swedish Randomised Trial

The magnitude of benefit from fusion was small. It did not last more than 2 years.

Fundamental problems

- Lack of definite methods to confirm solid fusion.
- Weak association between pain relief and fusion.
- Psychological features predict outcome.
- Morbidity of pedicle screws
- Greater blood loss
- Longer operative time
Pedicle Screws and Plates

- Several studies have shown no usefulness of pedicle screws over interbody fusion.

- Practically in most cases pedicle screws are used.

- Marginal benefit for fusion.

- Higher likelihood of re-operation
Fusion with pedicle screws is associated with
(Comparative study)

- Double the risk of complications
- Increased rate of blood transfusion
- Prolonged operative time
- Post op. increased morbidity

Meyo RA et al: Lumbar fusion complications in median population.
Spine 18; 1463 – 1470 : 1993
Common Complications

1. Instrument failure –- 7%
2. Donor site chronic pain –- 14%
3. Neural injury –- 3%
4. Vascular complications are rare but catastrophic.

Failure of fusion

- Failure of fusion occurs on an average in 15% of cases.
- This has not improved with instrumentation.

Rate of Re-exploration

- Rate of re-operation is higher with implants than bony fusion alone

- Franklin GM – Spine 1994
- Thomson K – Spine 1997
- Bjanke CF – Spine 2002
- Fritzell P – Spine 2002
- Fritzell P – Spine 2003
More evidence is required for the use of implants in degenerative disc disease as an accepted indication.

Frequent complications, more re-explorations and higher cost does not justify use of implants routinely in absence of evidence based medicine.
Recommendations

- Implants undoubtedly are effective in selective conditions.

  However

  i) Variation in the rate of use of implants
  ii) Rapidly rising rates of surgery
  iii) High rate of re-explorations

  generates concern that implants are overused.
Conclusion - 1

- Implants for fusion should be safe for common indications.
Conclusion - 2

Research should shift from

- How to perform
  to
- Who should undergo fusion