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 instrumention.

P.L.I.F.

- I am one of the original proponent.
- It is gratifying to witness continuing interest in this operation.
- I have done 1000 PLIFs till

TRADIONAL 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

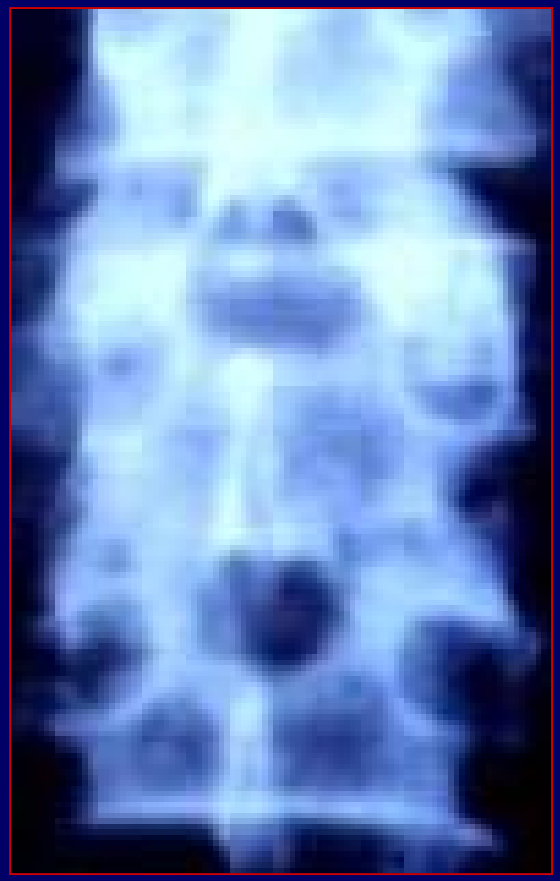
DYNAMIC X-RAYS AT 2 YEARS

EXTENSION

NEUTRAL

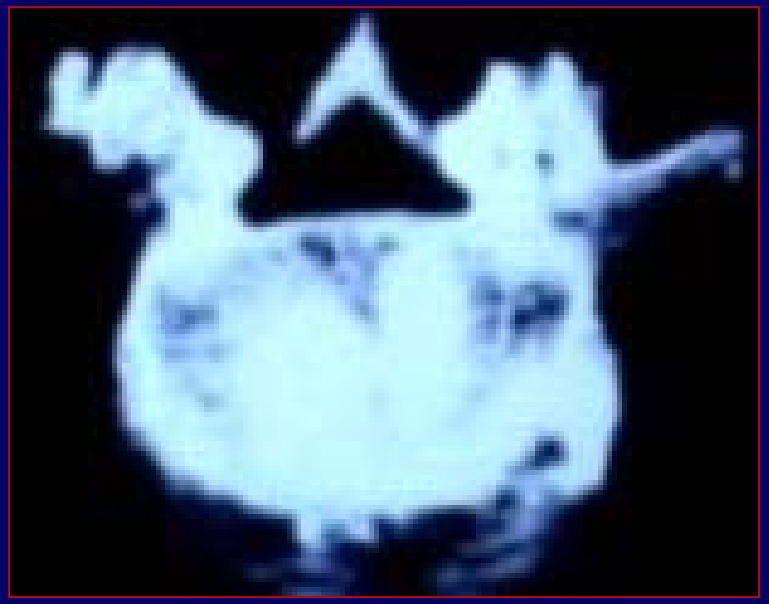
FLEXION

Solid Bony Fusion at 2 years



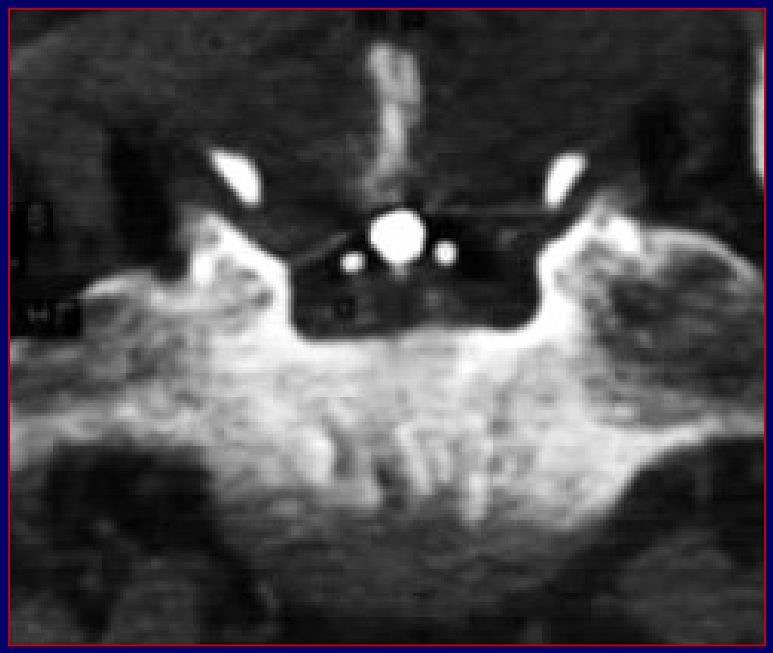
Solid Bony Fusion at 2 years

STUDY OF FUSION



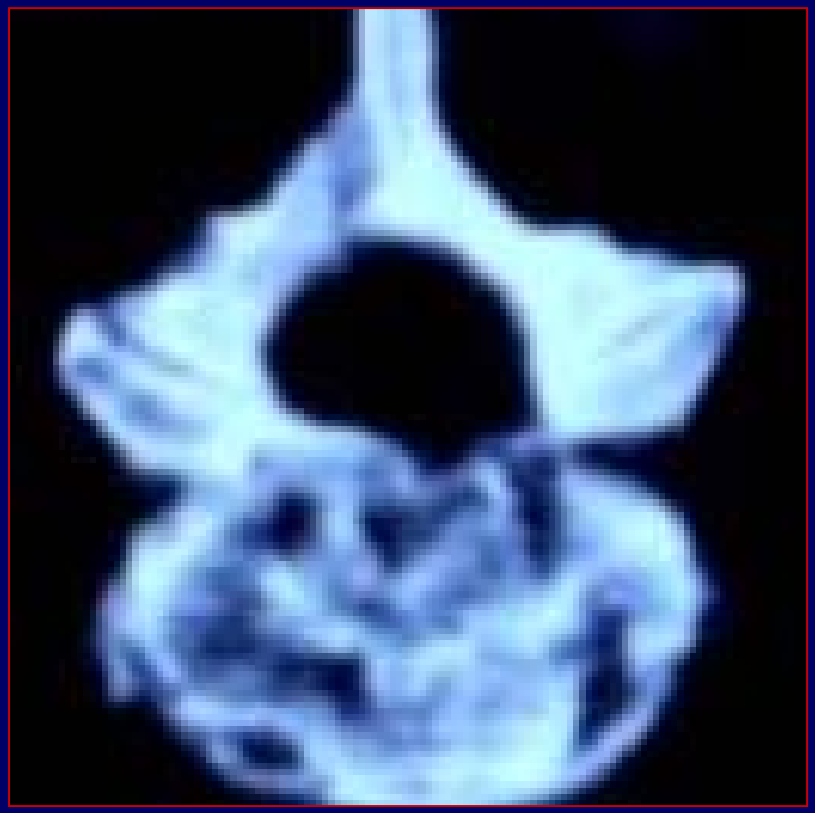
4 MONTHS

STUDY OF FUSION



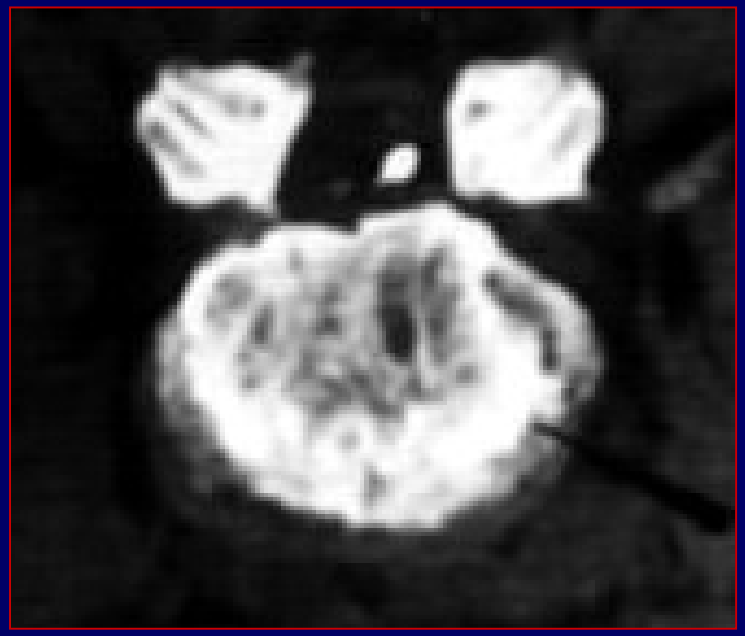
8 MONTHS

STUDY OF FUSION



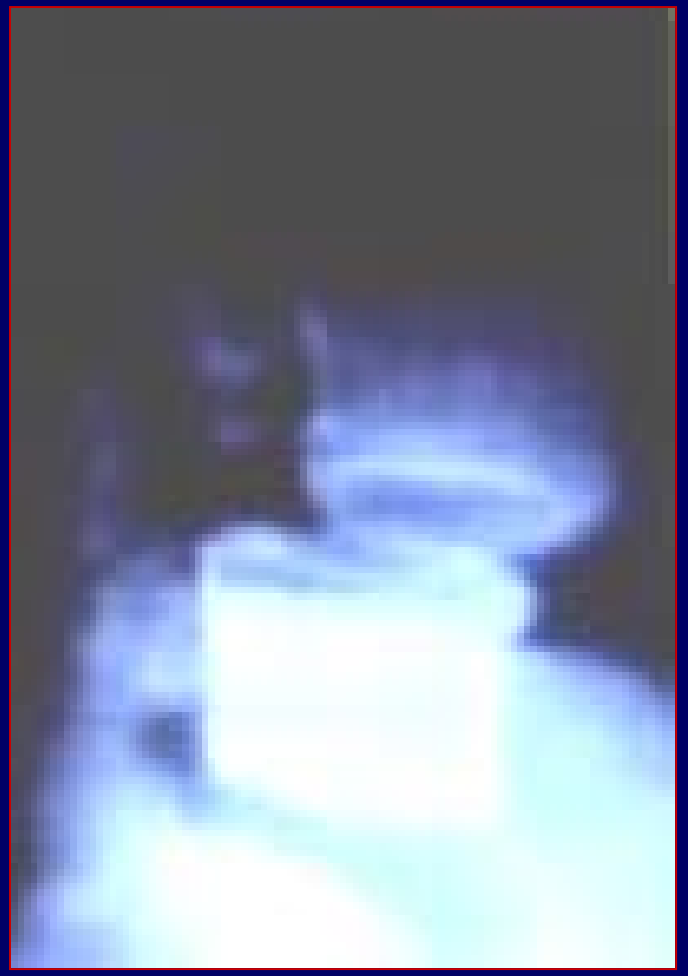
12 MONTHS

STUDY OF FUSION

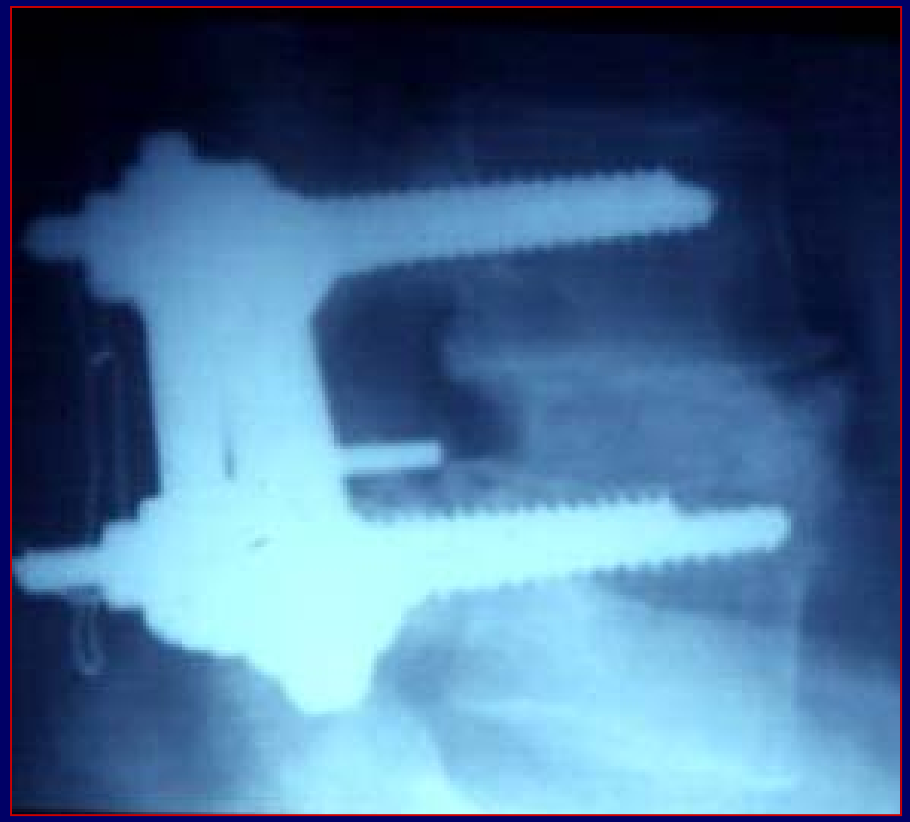


24 MONTHS

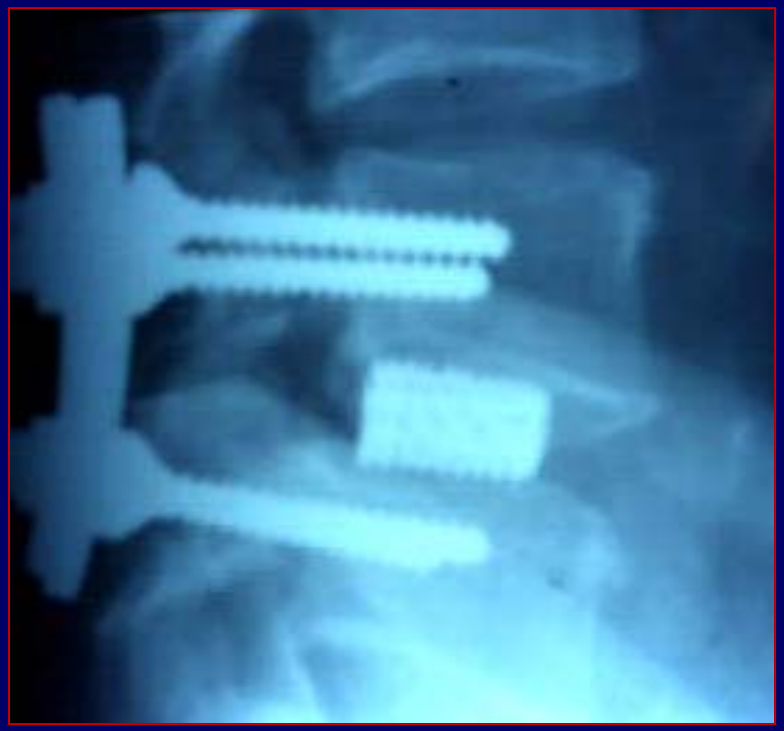
FAILED BACK



CORRECTION OF FAILED BACK



CORRECTION OF FAILED BACK



CORRECTION OF FAILED BACK

IMPLANTS

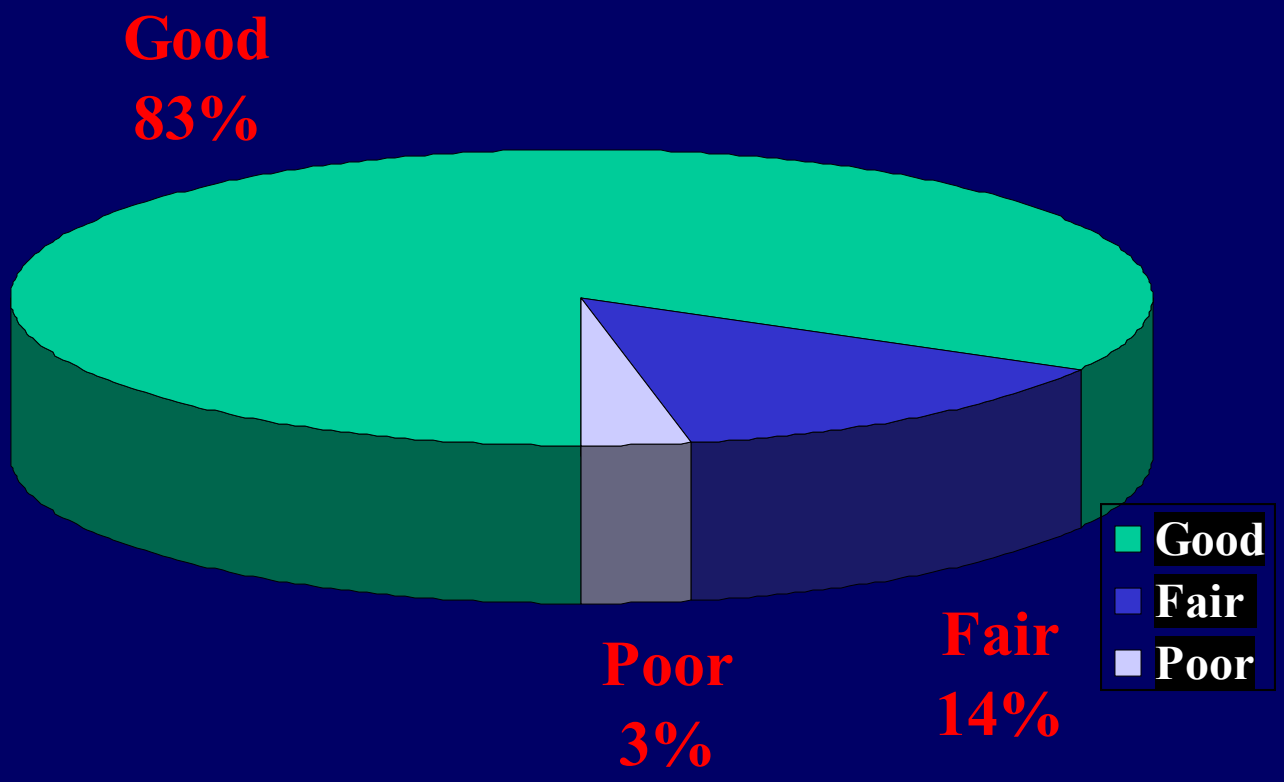
Should be used in selected cases with significant instability.

CLINICAL RESULTS

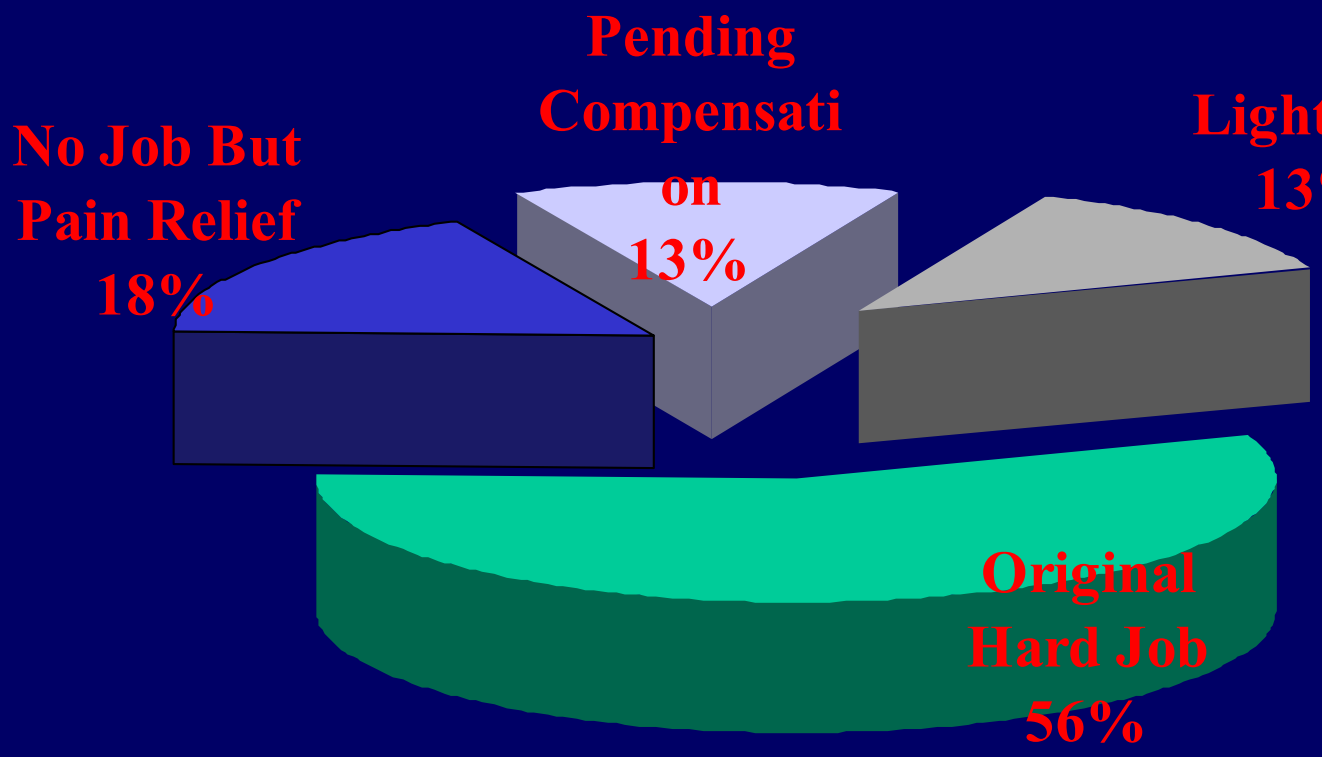
Clinical results of uninstrumented PLIF are superior when there is good steosynthesis and solid fusion.

- Three points for good Osteosunthesis are :-
  - Stable construct.
  - Large amount of Bone Grafts.

Clinical results 1994 correspondence



Clinical Results



MERITS OF PLIF

- In PLIF the Disc Space is empties of Disc Tissue and filled with Bone Grafts.
- Autologous bone impacted in the Space in high density manner causes good Osteosunthesis.
- 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 125pts with 44.8 months follow up

UNINSTRUMENTED v/s INSTRUMENTED PLIF

- Not enough series of instrumented PLIF available to do comparison.
- Fused Unistrumented 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 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.

CLINICAL NEUROSURGERY

VOLUME 47`

CHAPTER

26

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 desity autochips)

MEMBERS OF CLUB

7. Dr. Gabriel Ma — USA
   (Mortising chisel)
8. Dr. Alastair Robson
   AUSTRALIA (
   Clowardian technique)
9. Dr. Tomia 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 Osteogenecity

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.

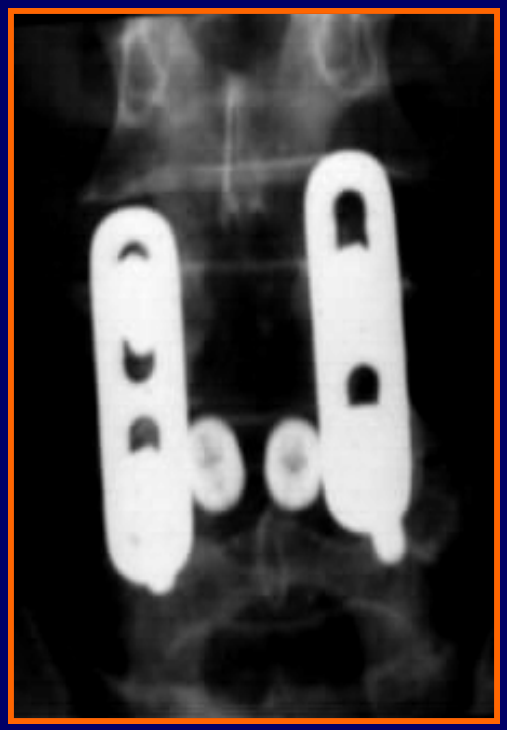
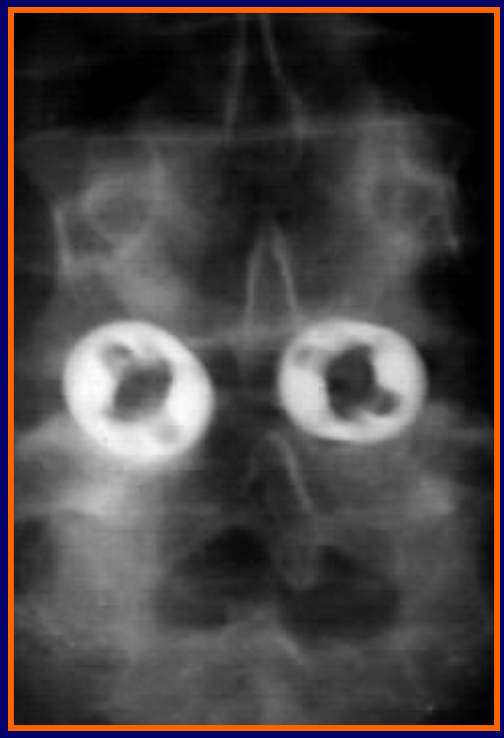
Bone Bank

Dr. Ramani's bone bank was developed in the department in 1985.

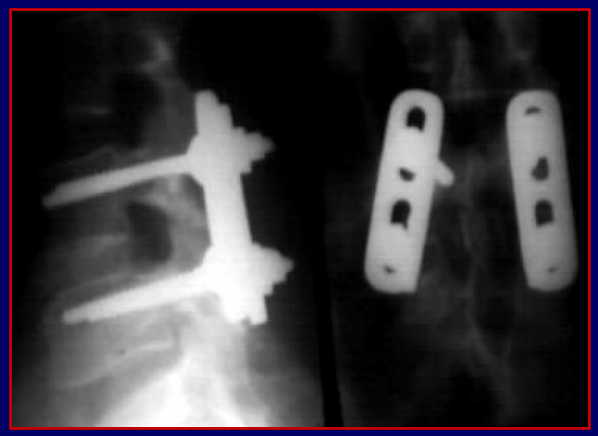
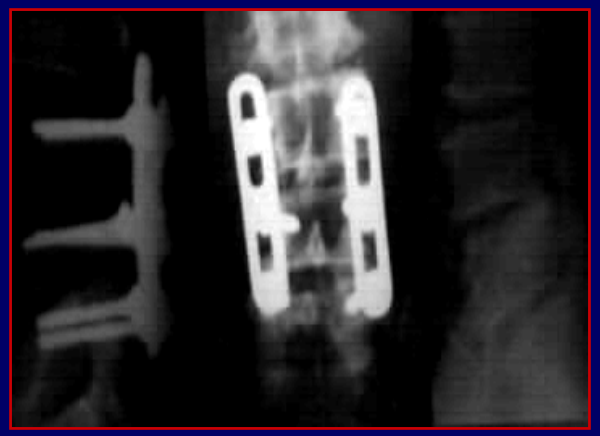
SOLID
FUSION
IN
PLIF

Implants flourished

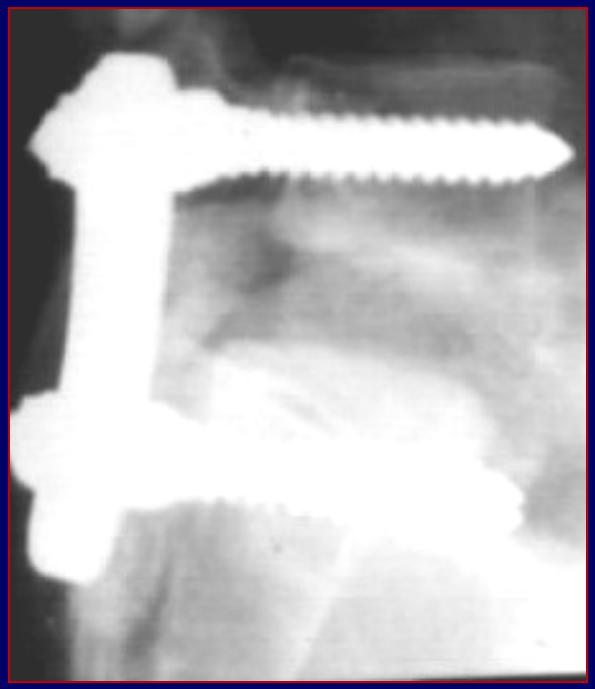
Last decade of last century saw implants flourishing tremendously and very soon steel implants were replaced by MRI compatible titaneum implants.

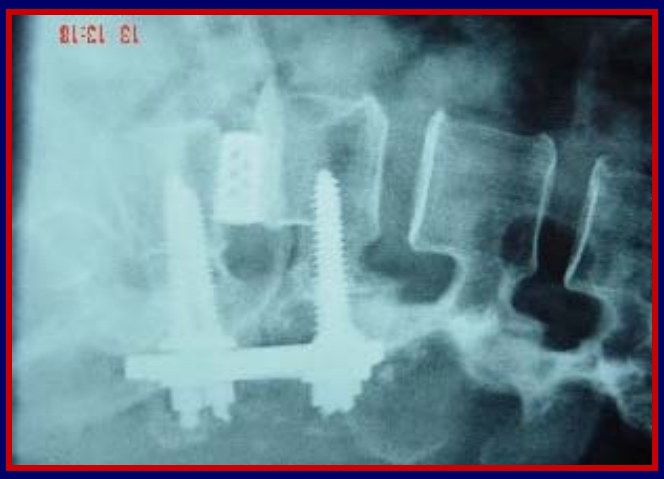




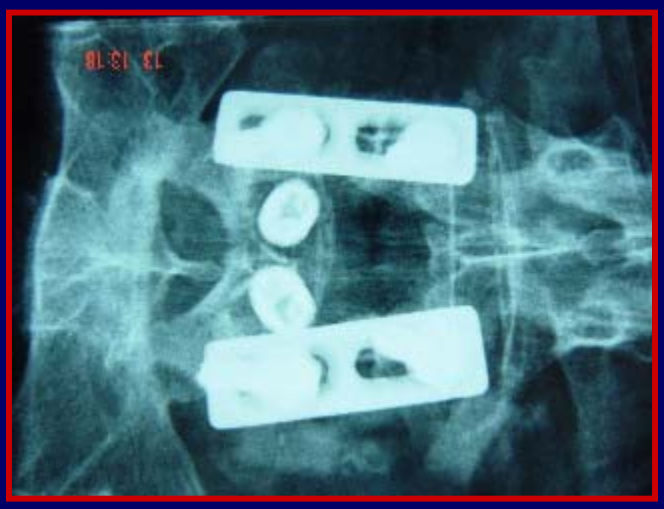



INSTRUMAENTATION FOR HIGH GRADE INSTABILITY







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**

Katz JN: Fusion rates. Spine 78 – 83 ; 1995.

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

Ciol MA; Deyora S ; Howell E et al: Assessment of fusion. J Am Geniatr SOL. 44 : 285 – 290 ; 1996

Spinal implants

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

Mendenlall Associates Inc. Orthopaedic News 13 : 7 – 8 ; 2002.

Latest addition to fusion

- **Discogenic low back pain without sciatica in presence of degenerative changes.**

- **Controvertial as diagnosis is based on discography which itself is a controvertial procedure.**

Nachemson – Lumbar discography spine 14 – 533 – 557; 1989.

Discogenic Pain and Fusion

- Backpain and disc degeneration is universal with ageing.
- Number of potential candidates for fusion is enormous.

Spondylolisthesis with stenosis

- **Randomized trials suggest benefit from fusion after laminectomy.**

Herkowitz H.N, Kurz L.T:

Spondylolisthesis with stenosis.
Spine 22: 2207 – 2211; 1997

Stenosis without instability

- **Fusion has not produced better results.**

Katz JN; Lipson SJ; Lew RA et al: Laminectomy alone in lumbar spinal stenosis. Spine 22 : 1123 – 1131 ; 1997.

Discoidectomy for PLIVD

- Comparative studies suggest no advantage with fusion.

Turner JA, Evsek M, Herron L et al: Fusion and PLIVD. JAMA 268 : 907 – 911 ; 1992.

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.**

Fritzel P et al: Spine 26; 2521 – 2532 : 2001

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.

Richardson WJ: Complication with fusion in spinal surgery – Current opinion Orthop 4 ; 155 – 159 : 1993.

Failure of fusion

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

Turner JA et al: Lumbar Spinal fusion JAMA – 268 ; 907 – 911 : 1992.

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

Observations

- 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


SPINAL SURGERY