LUMBAR INSTABILITY SURGICAL TREATMENT WITHOUT FUSION: SOFT SYSTEM STABILIZATION

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The existence of intervertebral lumbar instability is now well established but the definition is still not celar. From that we understand why the diagnostic is sometimes ignore or believe without sufficient proof. The treatment proposed is often insufficient or excessive. The author proposes different tests for a better understanding of instability. On bending and flexion/extension X rays, with the help of a microcomputer we are able to measure the shear deformity of a disk. On M.R.I. documents bony fatty degeneration image in subchondral bone seems to be correlated with F.S.U. abnormal movements. None of these signs are pathognomonic. To understand in 3D the F.S.U. normal and abnormal movements is fundamental. This is why lateral or A.P. approach of the spinal uit is frequently insufficient. Morever the 3D analysis leads us to understand that intervertebral movement is complex corresponding to macro, micro and coupled motion. Pathology will desorganize this complex situation in a subtil way which makes dificult an easy diagnostic. The autor proposes the C.T. Twist-Test to analyse the horizontal movement between vertebrae. So doing the facet decoaptation when twisting can be observed adding the third dimension to the analysis. Finaly a direct in vivo (O.R.) measurement is proposed with the help of a measurer adapted on pedicular screws. The proposed surgical treatment needs pedicular implants which are linked together by polyester threaded bands. The device maintains the two vertebrae in extension which in stabilizing. The posterior pre-stress so generated is calculated between 5 to 10 kilogrammes. During the first follow-up (2-3 months) a progressive viscoelastic adaptation of the remaining disk will take place and at the same time a creep of the band can be observed (15 %) so that a new amplitude of some degrees in F.S.U. movement can ble measured in the extension area. This method has been used for more than three years as a surgical treatment in low back pain secondary to instability. DDD, spondylo 1-2, spinal stenosis, disk recurrence, and upper level instability are good indications. The author proposes an adaptated therapeutic response to the wide variety of pathologic problems caused by lumbar disk degeneration.

Key words: *Lumbar spine - Instability - Surgical stabilization - !Without fusion - C.T. Twist-Test - Bands - Pedicular implants.*

Chronic low back pain is an important medical concern in our societies and it is far from having been fully understood.

The emergence over the past few years of the concept of vertebral instability is heading towards an attempt at clarification, but this concept has not been entirely defined.

In observing the therapeutic scene, one notes that wide divergence exists between medical and surgical methods.

The medical means are numerous and non-aggressive; the surgical means are essentially in the form of arthrodesis and are relatively aggressive.

Herein lies a real therapeutic void which does not permit a response to all the nuances of pathology.

Moreover, it is noted that the semiology of degenerative lumbar pathology makes a distinction along two apparent axes: the neuro-surgical conflict, on the one hand, and the loss of intervertebral articular stability on the other.

Between these two tendencies there is all the phossibility of intermediary semio-logical nuances depending on the relative importance of the association.

If the common arthrotic pathology of the lower limb is compared to that of the spinal column, totally different evolving qualities are identified.

Certainly a hip pathology, for example, will only become more aggravated, finally adopting a quasi-exponential evolution. Back pain in relation to an involutive transformation tends to disappear progressively, leading, after a rather long period of time, to a return to comfor.

This cyclical evolution of the spine has often reassured medical logic and treatment. Exponential evolution has established the glory of the surgical treatment of the hip.

These particular semiological characteristics of the vertebral column are found in its anatomy. In effect, it

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is a multi segmented organ, since each joint is tridimensionally complex.

The interface is not only a simple system of sliding between two cartiliginous surfaces but it also involves an element of visco-elastic nature: the intervertebral disk.

The existence of the disk places the intervertebral joint in "non-mechanical linkages".

This joint is stable when there is no shearing relationship.

Shearing may be temporary, at the time of a movement, or permanent, in the case of malposition.

Thus, the concept of intervertebral instability is very broad. It distinguishes between, and associates, the unstable movement and the chronic unstable malposition.

The broad lines of the chronic lumbar landscape have been sketched. Thus, within this context, a peroperative observation has been made and will be described.

OBSERVATION DATA

During surgery in the lumbar region, after having located the intervertebral joints without opening the capsule, it is possible to observe the behaviour of the posterior joints under various kinds of mechanical stress.

If the intervertebral joint is normal, all mechanical requirements in flexion, extension or in rotation, even in inclination, lead only to an identical response in the intervertebral joint, that is, the shearing of facets, one over the other.

It is nonetheless possible to observe occasionally separations of these two facets, that is, a gaping or even the creation of an intra-articular void at the time of these same mechanical requirements.

When obtained, this phenomenon is accompanied by an effect of intra-articular aspiration in the lower portion of the capsule and the peri-articular fat which accompanies it.

The aspiration is often accompanied by a slight, suction-type noise.

The phenomenon usually occurs suddenly under progressive stress, as if, during the course of the movement required, a break in balance, particularly rotative, were obtained at a given moment.

The capsule is then placed under great pressure.

In order to observe this gaping, it is necessary to perform an essentially rotative, slightly in flexion, tridimensional movement with the superior vertebra.

The amplitude of the rotative movement thus obtained using the bias of gaping is of the order of five to ten degrees.

Gaping is often unilateral but it is not uncommon to be able to obtain the same phenomenon on two sides of the same intervertebral joint.

It is noted that the L4-L5 joint appears to be that which is the most frequently acted upon.

It conclusion, an abnormal movement between two lumbar vertebrae has been observed during tridimensional mobilisation in flexion and rotation.

This movement leads to an abrupt separation of the articular facets accompanied by a suction noise and places the articular capsule under pressure.

SEMIOLOGICAL CORRELATION OF THIS OBSERVATION

An attempt has been made to discover the semiological characteristics of patients with this gaping phenomenon.

PLACING IN A CLINICAL CORRELATION

The pain: The patients involved feel usually asymmetrical back pain.

Acute accidents occur against a background of permanent pain.

Then the pain is abrupt, fleeting, surprising in its intensity, agonising. A number of patients describe it as a "stab in the back", a "sting". It leaves in its wake a feeling of anxiety. The patients are surprised by this feeling and fear its recurrence.

The pain is frequently prolonged by irradiations in the buttocks or anterior side of the thigh, or all around the iliac crest. The crural region is often invaded.

The sciatica or cruralgia described is not accompanied by objective neurological signs. Nonetheless, some patients feel pins and needles in the lower limbs.

With time the lumbalgia becomes progressively installed and chronic, with a painful background and acute exacerbations. The intensity of this chronic lumbalgia increases, "spoiling" daily life and causing numerous interruptions of work.

After several months or years of evolution, this semiology leads to medical consultation.

Muscular contraction

This pain is automatically accompanied by an asymmetrical muscle contraction.

This muscle spasm is then frequently irradiated in the dorsal, cervical or buttocks region.

The permanent presence of an asymmetrical muscle contraction acting as a guard is often detected.

The muscle spasm may sometimes take on a major, extensive, blocking importance.

In these cases, following a violent intial pain, the entire lumbar region is immobilised as if taken as a whole and put into an habitually cyphotic position of the lumbar region.

This confines the patient to complete functional impotency which progressively disappears within a few days. Finally, no neurological sign is noted, although the patient frequently describes this feeling as paralysing.

The Triggering Factors

Lumbar pain due to gaping is often triggered off by movements.

Three movements or positions are very evocative of this phenomenon when they lead to pain: rotation of the torso, the patient sleeping, when changing from one side of the bed to the other.

Likewise, pain when missing a step.

The latter element produces agitation in the torso when, walking down stairs or crossing the street, the heel hits the ground abruptly, the knee in extension.

In the same manner, sneezing may be the cause of a shock to the torso. These triggering effects of sneezing or ankle involvement are highly suspected by patients who have already experienced them. It is not unusual, when questioning the patient, to hear that a search was made for protected position when the feeling of sneezing became imminent.

The same is true for turning over, when in the prone position, where the patient often describes a serie of precautions in movement so as to permit himself to turn as a whole "block", thus avoiding pain. Nonetheless, numerous accounts reveal that it is often an innocent, usually rotative, movement using muscles taken by surprise which causes the most violent sensations.

Finally, a prolonged seated position is very frequently poorly tolerated.

RADIOLOGICAL CORRELATION

There always exists an involution of the intervertebral disk

When gaping has been observed during the course of surgery, it was always possible to detect an involution of the intervertebral disk involved.

Occasionally this involution has existed for some time and is accompanied by well known signs of arthrosis orientated toward instability.

For the sake of information, the everted osteophytes of MAC NAB and the densification of the subchondral bone of the vertebral body will be cited.

Small malpositions in ante- or retrolisthesis of the vertebral bodies are also noted, as well as "parallel" appearances of the vertebral plateaux.

Normally the posterior joints show signs of arthrotic, non-hypertrophic rearrangement.

However, sometimes the radiological signs remain extremely mild, especially in the initial stage of discal involution.

For these patients, it is possible to detect signs of intervertebral laxity using dynamic frontal or lateral films.

Dynamic appearances of radiological intervertebral relationships

The subject is placed in the seated position; he is X-rayed in lumbar flexion and extension, and likewise in right and left lateral inclination.

The relative displacement of the vertebral bodies in relation to each other is then noted.

The angulation and relative translation of the vertebral quadrilaterals are calculated.

The radiological projection of the vertebral bodies shows rounded angles and is often deformed by the pathology. This appearance is not propitious for calculations.

In order to avoid this snag, the vertebral body is redefined.

Using the micro-computer and a digitalising table, the coordinates of 12 points distributed along the radiological outline are taken (2 points per angle, one point per side). This permits a reconstruction of the outline using a B-spine formula. By means of a linear regression calculation, a well defined quadrilateral is redesigned on this figure, allowing calculations to be made.

The calculation of relative angulation is easy to obtain.

For translation, the latter is calculated in degrees, considering in a certain manner the loss of homotetic relationship from one vertebra to an other.

The difference in angles between the crossing of the vertebral plateaux and a straight line joining the middle of each plateau is considered.

Without translation, this angle difference is nil. With translation, the differential angle obtained is proportionally accentuated.

This measurement in degrees appeared to be more reliable and comparative. It can be obtained from frontal and lateral veiws.

Laterally, this measurement appeared to be significant above 8 degrees. Numerous patients in effect showed a laxity which permits a certain translation in flexion-extension. However, above 8 degress, this translation is associated with gaping and the symptomatology described.

The same calculation on frontal films appeared to be more significant. Above 5 degrees (within a few errors of measurement), this translation corresponds to an abnormal movement. Under these conditions, the frontal translation is accompanied by a small rotative movement. This rotation is noted in the break in the path of the spine and the relative displacement of a pedicular projection in the vertebral body.

These modifications on right and left bending seem to be less criticizable given the notion of individual laxity and are thus more indicative of intervertebral stability.

Nevertheless, the overall calculations provide an approach to the axity of intervertebral movement, without giving the formal proof of the pathological appearance, or lack of it, and thus the instability.

CORRELATION WITH NUCLEAR MAGNETIC RESONANCE IMAGES (M.R.I)

The nuclear magnetic resonance images in our patients systematically provide signs of dehydration at time T2 and confirm the diagnosis of discal involution systematically associated with instability.

Conversely, numerous discal involutions are not accompanied by painful unstable semiologies.

In cases of instability, two other kinds of signs are frequently noted with regard to a modification in the characteristics of the sub-chondral bone.

- At time T1, in te sub-chondral position, an oblong, white, mirror image is noted, indicating a fat degeneration throughout the intervertebral joint.

This image is generally median, but it sometimes adopts anterior or posterior positions. Its mirror appearance is frequently found; howeyer, it may be clearly asymmetrical, localised only in a single vertebral body.

- At time T2, a hyper-clear band has frequently been detected, in the sub-chondral area, as a mirror, indicating the presence of hydrated, inflammatory elements. It is of course noted that the localisation of these signs is sub-chondral at exactly the same place where intra-osseous condensations sometimes occur later.

It has been reported in the literature that 20 ~ of discal involutions are accompanied by M.R.I. signs described above. Our experience has shown that this percentage corresponds to patients having instability.

Thus, all discal involutions are not unstable, and the gaping of posterior joints is simly a particular mechanical complication and not obligatorily a discal involution.

A more in-depth study is currently being carried out, aimed at comparing two sufficiently numerous populations so as to be able to confirm this observation. This same work will lead to an observation of any possible modification in these M.R.I. signs following treatment of the instability.

Moreover, it seemed that the existence of hydri signs at time T2 had an additional value. In these cases, discal involution is isolated (often L4-L5). In these cases, collapse of the disk is very marked, as if resorbed. Still, breaks in the vertebral plateau were observed. Might there be an etiopathogenic biological factor? In such cases, instability is intense.

Regardless of the quality of the M.R.I. signs, the latter are valuable for the quality of the diagnosis they provide as well as for their early appearance. Nonetheless, the current difficulties in ease of obtaining such examinations still hinder our capabilities of having a comparative approach to large populations.

CORRELATION WITH SCANER IMAGES: THE C.T. TWIST TEST

Proud of these observations, it seemed important to be able to visualise the phenomenon of gaping prior to surgery.

In some cases it is possible to observe spontaneously a unilateral gaping of a facet, but in most cases, in dorsal decubitus, the facets are adapted to each other.

An attempt is being made to observe whether extemporaneously, as a function of the patient's position, it is possible to bring about the separation of the facets.

During the scan examination, we ask our patients to assume at wisted position of the torso, as if they had to turn over in bed. At the time of such a movement, they usually awaken the known pain. A scan section is then taken at the level of the disk, thus crossing the joints.

These sections allow the observation, or lack of one, of the separation of the facets. In order to quantify

the examination, the distance which separates two facets is calculated. This calculation is comparative between the neutral position and the "twist" position.

This calculation seemed significant when distance was doubled in torsion.

It is not unusual to observe the creation of an intra-articular void at the same time.

Thus, a real intravertebral rotative sub-luxation is obtained.

The presence of gaping has always been able to be correlated to symptomatology.

It is proposed that this examination be called the "Twist Test" and that it be indicative as a precious sign of intervertebral instability, but not pathognostic.

A more in-depth study, comparing 2 populations, is nearing completion.

CORRELATION WITH INTRA-FACET INJECTIONS

Like many, it has been a habit for us, for some painful, chorinc, lumbar phenomena, to inject some articular facets using a mixture of xylocaine and corticoid.

This test was thus used as an element for the confirmation of previously observed phenomena.

Once the gaping phenomenon has been observed on the scaner, the injection of the corresponding articular facet awakens and amplifies the patient's habitually known pain when one exceeds 2 to 3 cm3.

After an initial period of irritation, the patients see their painful semiology disappear.

The latter usually reappears one to two months following the injection.

During this period of calm, movements which were usually painful are no longer.

This last test is, for us, formal proof and allows a definiti ve diagnosis. The examination also allows a distinction to be made between two kinds of facet pains:

a) Arthrotic pain (usually hypertrophic), the course of which is rheumatic. This facet syndrome is generally cured by a cortisone injection into the facet.

b) Facet pain accompanying instability. The facet is arthrotic (often atrophic); it responds easily to the injection, but the calm is of short duration (2 weeks to 2 months). The return of the symptomatology is then as great as before. Repeated injections are more and more deceptive.

It thus seems that the facet syndromes must be split into two groups as a function of the quality of the response to the injection. The difference between these 2 populations involves the observation of the unstable movement, whyich is, or is not, associated.

PROPOSAL OF A DEFINITION OF "INSTABILITY"

Based on observation, it has been possible to demonstrate a correlation of clinical, radiological, M.R.I. sings which converge tomodensitometrically into a line of arguments toward the diagnosis of an unstable movement, commonly called "Lumbar Intervertebral Instability".

For these arguments, the M.R.I. and "Twist Test" signs appear to be the most specific.

A definition of lumbar instability is proposed:

"There is a lumbar instability when, during the course of a usually rotative movement, the laxity of the degenerative joint terminates in a gaping accident of one or two posterior articular facets"

The gaping of an articular facet is the expression of an abnormal movement present within the instability clinic syndrome.

The diagnosis of instability is best approached using the "C.T. Twist Test".

That definition of instability only applies to the unstable movement. It will have to be replaced in the future in a wider definition that will include the chorinc unstable malposition. It has been observed that the tridimensional quality of the unstable movement - immediate or chronic - appears to be identical. In that case, the notion of a rotatory shearing dominates.

The decoaptation accident of the unstable movement will have to be replaced by the notion of structuralization, well known in the scoliosis, as for exemple for the chronic malposition.

PROPOSAL OF A PHYSIOLOGIACAL UNDERSTANDING OF THE PHENOMENON

When walking on two feet, the linear mechanical work of the lower limbs is transformed at the level of the hips into a rotation and inclination movement in the pelvis.

Thus, when people move about, the pelvis is permanently called on to perform a complex movement, the rotative component of which is considerable.

This movement acts on the lower extremity of the spine.

If lordosis did not exist, the lumbar region would look like a multi-segmented mast.

The rotative excitation of the base of the latter

would obligatorily bring about considerable rotative mechanical stresss between the vertebral sections.

The presence of lumbar lordosis transforms this local rotative stress into overall rotation of the entire region. On the other hand, the mechanical work of the extremities of the lordosis is more marked.

It is thus necessary, in order to avoid too great a stress on the junctions, to absorb part of the rotative movement inside the lordosis itself.

It is the presence of posterior joints which will allow this absorption, by transforming the rotative movement into one of lordosis-dislordosis.

It has already been recalled that there exists only one degree of liberty for these joints, and that is the sliding of one facet over another.

Thus, the posterior articular column can only be lengthened or shortened.

Given the fact that the articulations are two in number (right and left), the asymmetrical work terminates in a right or left inclination.

If, now, it were possible mentally to isolate the triangular relationship of the joints from the complexity of intervertebral articulation, at the horizontal level, an isosceles triangle is obtained, the base of which connects the two posterior joints and the peak of which is found at the anterior part of the intervertebral disk.

Now, let us apply the physiology of the posterior joint to the relationship between two triangles.

The asymmetrical shortening of one of the two posterior columns leads to an effect of inclination and lordosis.

These two movements combine in an obligatory third movement due to this tridimensional relationship.

This movement is none other than rotative in relation to the horizontal level.

When several triangles are joined together, a cumulative effect of differential intervertebral rotation is obtained by the simple play of asymmetrical lengthening or shortening of the column of posterior joints.

It is thus possible to understand that when walking the rotative movement of the pelvis ispartially absorbed in the lumbar region. This absorption takes place among the vertebrae themselves, by means of differential rotation and accentuation of the initial lordosis.

Thus, the linear movement of the lower limbs is transformed into a complex and rotative movement in the pelvis and then absorbed in the lumbar region by acting on the pre-existing physiological curvatures of the spinal column at the sagital and median levels.

Of course one may consider the physiology of the lumbar region as that of a shock absorber which deals with longitudinal blows and shocks and is capable of relaxing in anterior flexion.

However this understanding of the tridimensional quality of intervertebral movement permits an understanding of how this area is permanently acted upon at the time of walking so as to transform the rotative movement of the pelvis into a wavy movement, according to the physiological curves of the spinal column.

In this context, the degenerative pathology, and particularly the involution of the lumbar disk, behaves in a markedly disorderly manner.

This poses a dual problem: the decrease in intervertebral height and the loss of lumbar lordosis.

Thus, the mechanical rotative intervertebral stresses become more marked, since they are no longer favourably transformed into a regional rotative movement.

Also, the loss of intra-discal tone leads to a relaxation of natural, pre-constrained ligmental braces.

This allows a progressive increase in the possible amplitude of tridimensional intervertebral movements.

Intervertebral laxity and an increase in intervertebral rotative stresses are most certainly the two combined elements which lead to the accident of gaping of the articular facets.

It is thus possible to deem that gaping is nothing but the final accident of a physiological movement rendered lax due to discal involution and the amplitude of which was too strongly acted upon in rotation.

WHAT THERAPEUTIC RESPONSE?

AIM AND PRINCIPLE

As has just been understood about the phenomenon, the aim is to avoid the gaping accident.

In addition, it is desirable to restore lumbar lordosis so as to reposition the stabilised joint away from rotative mechanical aggressions.

Finally, it is desirable to preserve the flexibility of this lordosis so that maximal lumbar physiology can be expressed in the relationships with the pelvis during walking.

For this, it is proposed to use a supple posterior pre-constraint with the help of a polyesther band. It allows the local stabilisation of the joint by making gaping impossible.

This posterior pre-constraint is performed via pos-

terior and longitudinal route from one pedicle to another, either symmetrically or asymmetrically.

Experience has shown that providing this pre-constraint is sufficient to obtain rotative stabilization.

Often only a unilateral pre-constraint is necessary. Some particularly marked instabilities do, however, require a bilateral constraint.

The use of stress on a single side up to level L3 leads only to a stabilization and lordosis, without lateral inclination. This postero-lateral stress from one vertebra to another, from one side or anotherl, leads to the stabilization of the normal movement as well as to a reduction of the intervertebral malposition.

This posterior pre-constraint remains sufficiently supple so that bending efforts can take place and thus again help in the absorption of the rotative mechanical shock in the pelvis.

Flexibility is obtained using a polyester band, the firm elastic characteristics of which oblige the soft and viscous system of the disk to adapt via a plastic transformation to lordosis.

COMPOSITION OF THE SYSTEM AND INSTALLATION

Screwed pedicular implants.

A stable and solid anchoring of the band is desired. For this reason, a long and strong implant has been designed.

Its spongy part in the vertebral body is equipped with a wide screw thread which is resistant to traction; its pedicular portion is conical and full, with a rough surface so as to obtain a blockage according to a mechanical effect in the corner, in the pedicular sand.

The externel part remains smooth; it receives the band and stabilises it by means of a half-collar.

The positioning of this implant in the vertebra takes place along the anatomical axis of the pedicle, with a slope varying from one vertebra to another, of the order of 15 degrees in relation to the saggital and median level.

At the horizontal level, the implant is parallel to the superior vertebral plateau.

The philosophy of this implant tends to relate it to the stabilization of a cephalic prosthesis in the femoral shank or again that of a dental implant. Although for practical reasons it is screwed into place, the notion of a vertebral screw is avoided so as to come closer to that of an implant which, bly virtue of its anchoring qualities, permits a stable and solid excrescence which can ble part of the vertebra to be pushed to the surface of vertebral anatomy.

The positioning technique is simple. After having found the entry opening, a curette guided by small rotating movements allows the intra-pedicular path to ble found with a minimum of risks.

Interpretation of the length of the implant is made on the curette calibrations.

The sacral implant isplaced below and outside the lumbo-sacral joint, obliquely toward the interior, in the direction of the promontory following a path parallel to that used for the implant of the fifth lumbar vertebra.

Most of the time, for this implant, it is useful to slightly perforate the anterior cortex at the fore so as to obtain a greater adhesion. The implant, thus positioned. and despite the absence of pedicular sand, is highly stabilised.

The slope of the implant along the anatomical axis permits its use along its entire length and with the largest cone possible, in order to obtain the equivalent of a pinning or placement of a prosthetic terminus.

Morover, this slope positions the fastening area laterally in relation to the joint and even slightly to the fore. This anatomical area immediately behind the transversal is located in the middle of the vertebra.

Mechanically, this implantation, just behind the mean column, appears to be the most favourable for obtaining the desired stabilization effect.

In addition, given the short length of the implantation area and this favourable location, it is estimated that the leverage of the forces which might subsequently act on the ligament has been reduced to the maximum.

The bands are composed of 8 mm (0.32 inch) tubular braided polyesther, re-sutured to itself

The length of the bands have a progression from 2.5 by 2.5 mm 50.10 inch).

In this manner, the choice of length allows the desired tension to be obtained.

Calculation of the length is made using a measuring pincer which bly taking hold in the pedicular implants put into position, allows a calculation of bloth the desired tension and the necessary length.

Adaptation of the bands is easy using an elbow crow-bar.

The tension chosen must be sufficient to eliminate local instability and gaping phenomena.

Various uni-or bilateral mountings at one or several levels canble obtained.

CLINIC CASE SAMPLES

There have now been three full years of experience using this method, a time when these various concepts and tests described above were maturing.

Indications for the method are:

1) Intervertebral instability, as just described, is certainly the main indication.

2) By extension, this method has been indicated for degenerative spondylolisthesis without isthmic rupture, then for stage 1 and 2 spondylolisthesis which had been well tolerated until the third or fourth decade and which degenerated at the time of discal involution.

3) Canal stenosis requiring an iatrogenic endeavour such as punction of the posterior arch can benefit from a supple postero-lateral stabilization.

Initial results are encouraging, then had led to go on the trial in process. Final results of which will be published with an average of 3 years follow up.

DISCUSSION

We are well aware that such a therapeutic proposal is likely to provoke numerous reactions and discussions.

Of course, placement in a position of posterior preconstraint and lordosis goes against therapeutic usage.

Numerous authors have, to the contrary, proposed to distract from the lumbar region in order to obtain relief of the neurological conflict. The elimination of the therapeutic endeavour at arthrodesis sets us apart, and has for numerous years of surgical experience, and indeed we are aware that it will take another 2 to 3 years of collective observation for such a daring stance to be firmly established.

Nevertheless, as regards simplicity and small amount of iatrogeriatry in the method, we have noted an important antalgic therapeutic effect, very often in immediate post operation.

this kind of relief is already known in spinal surgery with radicular decompression, but it has not yet been noted with an attempt at intervertebral stabilisation.

Obviously, in other joints suchy as the knee, numerous authors have noted the failures of an artificial band in the mean and long term, but in our usage it is not a question of replacing a torn band but simply of a reinforcing "fastening" or "mooring" endeavour.

Only the next three years will tell whether the difference noted in lumbar physiology will lead to a different response to an artificial implant.

Basically, it is felt that the bio-mechanical quality of the lumbar organ (multi-segmented and viscoelastic) causes a pathology of cyclicad and specific evolution.

In this context, the system being proposed is conceived of as an aid to discal involution and not as a prosthesis which would be totally or partially substituted for a diseased organ.

In this sense, moreover, after six to eight months of evolution, a slight relaxation of the band in relation to its initial tension has been observed at the time of renewed surgery (implants which were poorly positioned). At the same time, the radiological appearance of the disk had evolved toward a plastic deformation in lordosis.

This was interpreted as the adaptation of two systems, one in relation to the other: on the one hand, the discal visco-elastic system, and on the other, the more rigid ligamental system. One due to plastic transformation, the other to relaxation leading to a new balance which permits, at the same time that it maintains local stability and corrections in the state of lordosis, a certain freedom in posterior articular movement to be obtained.

X-rays in post-operative bending exercises in the long term have shown amplitudes in lateral bending and some degrees in flexion-extension.

Of course, the implanted system remains a hindrance for anterior flexion.

Is it necessary to fear root compression?

Indeed, it may be thought that the lateral recesses, already modified by arthrotic involution, might be definitively filled at the time of an extension movement of one vertebra to another when putting in place the posterior pre-constraint.

This fear has not been confirmed in our observation of our cases, for three full years.

Nonetheless, some lateral recesses shown to be narrow must be freed before being placed in extension.

However, in the light of these results, it is felt that some recesses which are apparently filled on the scaner image tolerate very well positioning in lordosis without any other radicular pain being noted.

A difference should nevertheless be made in this regard:

- When filling recess has a discal origin, this hypothesis may stand.
- Conversely, when filling of the recess is of arthrotic origin coming from the posterior joint, it is preferable to perform a neuro-surgical decompression be-

fore putting in place the pre-constraint, since radicular adaption is then difficult.

It has been noted that most of the gaping phenomena were not seen on hypertrophic joints.

Quite to the contrary, most of the time it involves degenerative phenomena of atrophic kind.

this can be explained, since arthrotic hypertrophic overlap tends more in the direction of natural stabilisation and the termination of cyclical evolution. Atrophic degeneration may more easily be the source of a mechanical disorder of gaping kind.

Likewise, it is logical to think that placing the vertebrae in lordosis might be responsible for pain of posterior articular origin due to placement under compression

Here too, our experience does not confirm this fear.

In a few patients only, initial post-operative pain which might correspond to this hypothesis has been noted.

In these few cases, nonetheless, it was necessary to have recourse to cortisone infiltrations in the facets.

These infiltrations were as effective here as when used for purely arthrotic facet pain, without phenomena of instability.

Of course, many interesting questions and discussions will arise, but time and the lyears to come should progressively provide the key to the responses and the indications so that this method can be better defined.

CONCLUSION

All of these observations allow the postulation of the hypothesis according to which the unstable intervertebral movement is a mechanical complication of discal involution, make the gaping of one or tw1o posterior articular facets possible.

The defect of lumbar lordosis is fundamentally associated.

With this understanding, the surgical programme proposed is seen as an aid to lumbar involution, eliminating the mechanical intervertebral complication and tending to bring the entire lumbar region back to a new balance in lordosis.

Success or lack of it in obtaining this new balance will certainly be one of the important elements, in the light of which it will be necessary to analyse the success or failure of this new method.

This work and the quality of the observed therapeutic effect allows us to think that the possibility of a supple stabilization will blecome reality for the good health of numerous patients after a long period of time of treatment by the intervertebral stiffness.