October 2001

ARGOS SpineNews

News from the world of **Spinal surgery and biomechanics**

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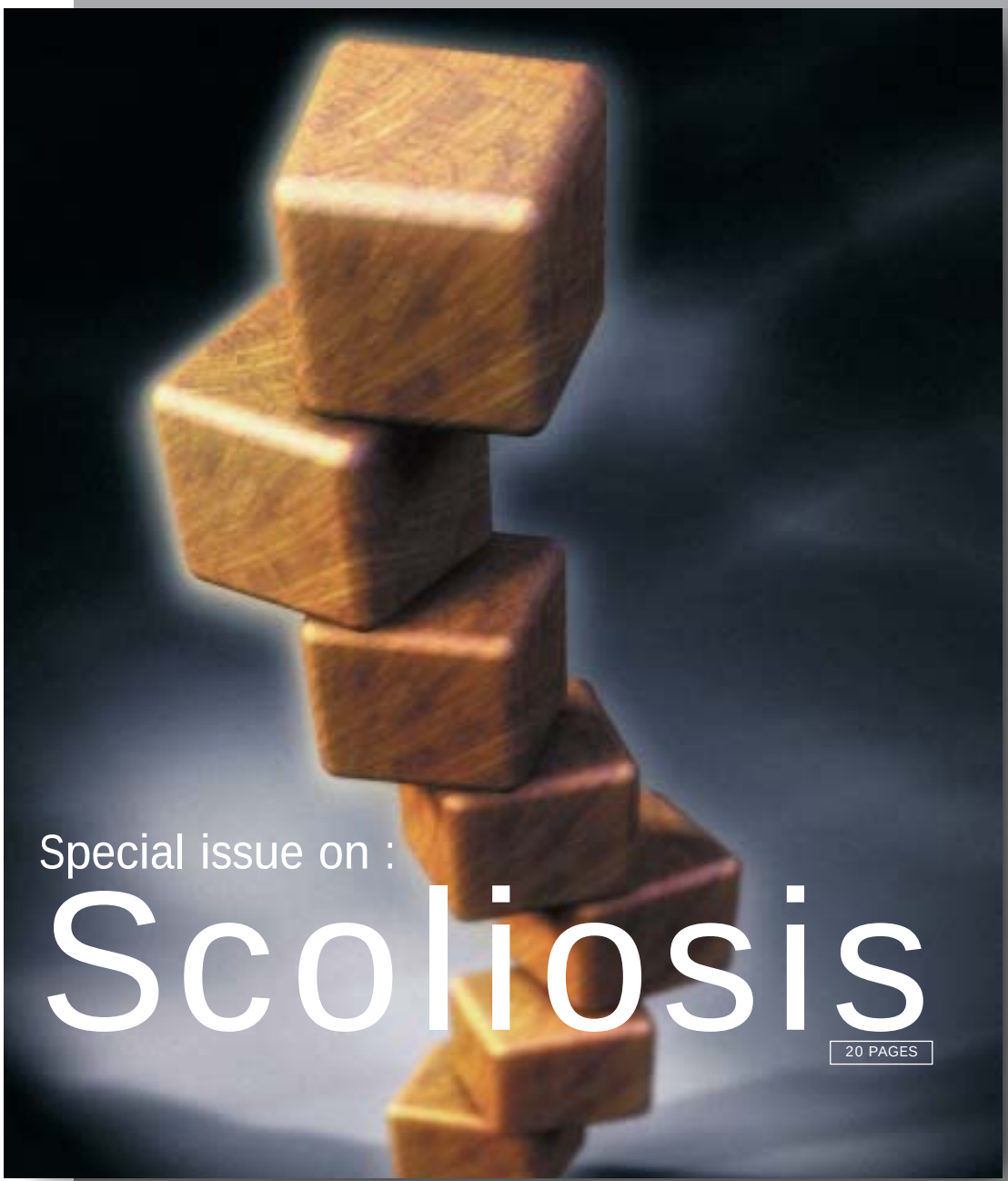

Special issue on :

Scoliosis

20 PAGES

THE OFFICIAL ARGOS PUBLICATION

October 2001

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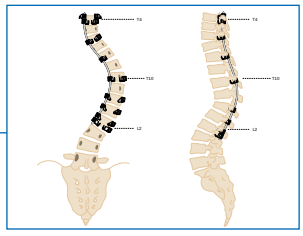
Summary

Communication

Evaluation

Training



ARGOS
SpineNews

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First surgeons, then tools...

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Editorial

Alexandre TEMPLIER
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ARGOS President

Dear Members and readers,

The last issue of Argos Spine News was dedicated to new technologies in Spinal Surgery. We have seen that most of these technologies were designed to improve the accuracy of the surgical act itself. Indeed, up to now poor technological efforts have been dedicated to help the surgeon in optimizing his clinical efficiency.Although technological aspects of surgery may be spectacular compared to clinical considerations, we have decided to focus our articles on specific clinical topics.

Scoliosis is one of the most famous issue among spinal disorders, because of the complexity of its ethiology. For many years, huge research efforts have been being focused on a better comprehension of this pathology, with major surgical and clinical breakthrough.

Today, scoliosis is widely recognized as a 3D deformation, thus requiring 3D exploration, analysis, and treatment. However, 3D imaging modalities remain costly and invasive, which makes 3D analysis and comprehension almost impossible in a clinical daily practice.Surgical techniques for scoliosis corrections are progressively moving to a personalized 3D correction approach, but pre-op planification and post-op evaluation systems are still missing in the daily clinical environment.

We wanted to dedicate this issue of Argos Spine News to this exciting subject that is Scoliosis, which remains one of the biggest clinical, surgical and technological challenge in Spinal Surgery. Of course, it will not be possible to cover this huge subject in only one issue. We will definitely dedicate further numbers on this topic if you wish so. So please, fell free to send your feed back, remarks, and suggestions about YOUR journal at contact@argos-europe.com .

We look forward to reading from you soon,

Warmest regards.

Interview with Pr. Mihai Jianu

"Gr Alexandrescu" Central Children Hospital, Bucharest

The " Grigore Alexandrescu " Emergency Hospital for Children is the oldest hospital for children in Romania, founded in 1886. Today, this hospital is a public one, part of a range of six emergency hospitals in Bucharest, taking care of more than 1200000 children from Bucharest and the metropolitan area. The hospital has 454 beds and five clinical departments: Pediatrics, Pediatric Surgery, Orthopedics and Trauma Surgery, Burns and Plastic Surgery, Otorhinolaryngology.
The Emergency Hospital is a clinical hospital of the University of Medicine and Farmacy of Bucharest.
The Pediatric Orthopedics department is equipped of 64 beds, three surgery rooms, a postoperative care unit, a bone bank. Eight surgeons, three anesthesiologists and five residents are working in this department. Every year, more than 1000 medical students attend lectures and do clinical practice there.
The diseases treated in this department are: bone trauma, congenital dislocation of the hip and other limb abnormalities, scoliosis and other spinal deformities, malignant and benign bone tumors, infections of bone and joints, limb length discrepancy, cerebral palsy and muscular dystrophy. This is the only orthopedics department in the country where the use of the botulinum toxin in the treatment of cerebral palsy is authorized.

ASN : Pr Jianu, could you introduce yourself to our readers and explain to us what made you choose spine surgery as your specialty in a country where this field has been quite neglected for a long time ?

After having graduated the Medicine School in Bucharest, I became a specialist surgeon in orthopedics and trauma at the biggest hospital in Bucharest - the Central Emergency Hopital "G. Alexandrescu". Later I became a professor at the Medicine School of Bucharest. I am now the Head of the Pediatric Orthopedics and Trauma Department of this School.

As for the second part of your question, I would say that it was especially because this discipline was highly neglected at a national scale that I oriented my activity towards spine surgery. When I started practicing, the spinal pathologies were hardly considered in clinical centers while the number of cases was dangerously increasing. So I considered that this discipline needed more attention, despite all the material difficulties we encountered to put it into practice.

ASN :You prepared your PhD thesis focusing on a quite particular topic - the set up of a bone bank - so you are the creator of the first bone bank in Romania. Why having chosen this topic and which is the role of the bone bank ?

Indeed, I concentrated my research activities on the bone bank set up because it is an essential tool for any orthopedics and trauma service, so my clinical activity guided my research choices. The importance of bone grafts is now well recognized, for the surgical treatment of malign tumors, pseudarthroses, dystrophies etc, in cases where the auto graft could present risks for the patient. In order to conduct my research I worked a lot with the "Pasteur" National Institute for Bioproducts and Vaccines, as I had to make a lot of experiments on animals to validate my findings. The main obstacle in my research work was the legislation void concerning this particular field of research. The corresponding laws concerning these topics have been voted only six years ago so you can imagine the difficulties researchers in this field had to overcome in the past.

ASN : Could you name some of those people who influenced your professional carrier choice ?

I had the chance to prepare my medicine studies with very good professors and I think that all of them played an important role in my present activity, but what really attracted me to orthopedics was on one hand its link to classical physics, which is a very practical aspect, and on the other hand its "artistic" and "feeling based" aspect, which is quite intuitive.

And, most of all, what fascinated me in surgery was the relationship between surgeon and patient. We should not neglect the fact that when we operate a patient we assume a huge responsibility

towards him for the rest of his life. This is the main factor that turns surgery into a continuous challenge.

ASN : At present, what are your main research activities ?

I am working on a research program concerning the precocious tracking of spinal deformities in children and adolescents. My purpose is to set the basis of a national structure which should deal with this problem in order to reduce the number of cases with scoliosis up to 70-80 degrees of Cobb angle at the first consultation, which is still very frequent in Romania.

You are, as far as we know, the only orthopedic surgeon in Romania treating scoliosis by surgical correction. Could you explain the reasons of this lack in the orthopedic surgery field ? Is it due to a lack of training of specialists or mostly to a lack of funds ?

It is true that in pediatric spinal surgery, there is no other orthopedic surgeon in Romania practicing the corrective surgery of scoliosis. In adult surgery, there are few surgeons dealing with the correction of the spine, but they use mainly the Harrington technique, which is far from being the best available technique, or even just bone arthrodesis. So we can talk about a lack of training for surgeons with regard to modern surgical correction techniques.

Rehabilitation service at the "Gr ALEXANDRESCU" Central Hospital

It is obvious that the lack of funds dedicated to the health system in general also played a major role in this particular field. Besides high prices of metallic implants and the auxiliary tools we also have to deal with an unfavorable national context regarding the number of students following a training for this specialization. At present, in Romania, there are only 10 medical doctors per year that can be accepted for this training.

ASN : In your opinion, what should be done in order to overcome this penury in spinal surgery in general and in scoliosis treatment in particular ?

First of all, it seems to me that it is compulsory that the government deals with the general problem of the health funds. Starting from this point, many other possibilities to rehabilitate this field can be taken into account - training of the surgeons, acquisition of specialized material, setting up of a screening/tracking program and so on.

ASN : We would like you to talk to us about your experience in the surgical treatment of scoliosis by the in situ contouring technique with the SCS instrumentation: which have been the most important steps in your training on this technique and which was the role played by the well known surgeons you have worked with ?

I started my activity in the surgical correction of scoliosis in the 80s using different techniques - Harrington osteosynthesis, bone arthrodeses with fibula, rib and iliac grafts. Later I started collecting information on posterior osteosynthesis of the spine with the CD and SCS instrumentations. Then I had the occasion to assist surgical corrections of the

Pr Mihai Jianu's short background

Professor of Pediatric Orthopaedics, "Carol Davilla" University of Medecine and Pharmacy, Bucharest. Head of the Department of Pediatric Orthopaedics and Trauma Surgery, "Grigore Alexandrescu" Central Children Hospital, Bucharest; Doctor of Medecine, doctorate thesis: "The creation and using of Bone Bank in Pediatric Orthopaedics"; Member of the International Society of Orthopaedics and Trauma Surgery (SOROT); Member of New York Academy of Science; Evaluation expert of "PHARE" and "SOCRATES" for the Ministry of Education.
Professor Jianu has a remarcable experience in spinal surgery, but also in deformities, trauma and bone tumour surgical treatment.

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Spinal Surgery
In 2000, 67 scoliosis have been operated by the spinal surgery team.

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spine at the Neker Hospital for Children in Paris where I worked with Pr Pouliquen, Pr Glorion and Pr Padovani. In Mai 1999, Pr Tamas Illes, from Hungary, came to Romania and performed in collaboration with our team the first osteosynthesis with the SCS instrumentation. Since then, we have already treated more than 100 scoliosis cases with this technique. The whole medical staff performing this kind of surgical correction have been trained and specialized in France, during one year, at the Neker, St Vincent de Paul and Garches Hospitals in Paris as well as at the CHRU of Strasbourg.

ASN : The global cost of the surgical correction of scoliosis with metallic implants is non neglectable in the specific context of a health system that can hardly afford supporting even basic health care. How come that you succeeded in treating more than 100 patients with scoliosis in less than two years ?

The answer to this question could surprise you, as it seems even to myself kind of a fairy tale. In 1996, while I was at the Neker hospital in Paris, I had the chance to meet M François de Combret, the President of the SERA Foundation (Solidarité Enfants Roumains Abandonnés). We discussed about the dramatic situation orthopedic surgeons were facing in Romania and he proposed to us to partially support the material we needed for the scoliosis surgery. So we concluded on a sponsorship contract which is still conducted at present. We owe to this happy event the treatment of most of our patients as well as the equipment of an operating room at the Central Hospital for Children, in Bucharest. This operating room is exclusively dedicated to spinal surgery and it is now equipped of a cell-saver, an evoked potentials device and all other necessary devices. The funds provided by the SERA Foundation also allowed us to modernize in its totality the pediatric orthopedics service of this hospital.

ASN : Could you give us some more details about the SERA Foundation ?

The Foundation started its activity in 1991 and is based in Paris, Rue de la Baume. In Bucharest, the subsidiary of the SERA Foundation is located rue Jules Michelet. The purpose of this Foundation is to provide with care in various ways the institutionalized children in Romania. They contact our service quite frequently for cases of congenital malformations and orthopedic pathologies. We already operated more than 200 children in this context.

The bone bank

ASN : You act as an evaluation expert for the PHARE and SOCRATES programs for the National Education Ministry. Do you think that the opening up of Romania towards Europe will soon facilitate the carrying out of common research projects related to scoliosis and/or to other spinal pathologies ?

Without any doubt these scientific cooperations will develop as soon as we will be able to set up well defined structures in Romania, in charge of the screening, tracking, follow-up and, why not, of the scientific research on spinal pathologies. Of couse, one of the major factors in this problem is the creation of a nucleus of specialized researchers, biomedical and medical staff able to set up, develop and promote this kind of activity in the particular field of the spinal deformities.

ASN : Which aspect of spinal deformities seems, in your opinion, to be the most "urgent" to explore in terms of a research program in Romania ?

Several aspects should be considered practically simultaneously - the etiology, the prognosis and evolution factors, diagnosis and surgical planning modern tools, new technologies and their impact in this field and, of course, the three dimensional aspect of spinal deformities, which has been too long neglected even though it is one of those factors best defining all spinal deformities. I personally think that completely understanding the three dimensional geometrical and also mechanical aspect of the spinal deformities could provide us with a lot of answers regarding an efficient therapy.

ASN : If tomorrow you were asked to set up a research project on the spinal deformities, which would be your priority in this moment ?

In the present context of our country, it is compulsory to monitor all cases of scoliosis by geographical region and department. This requires a complete screening in schools and the exact diagnosis including etiology, localization of deformities, therapy and follow up. And further more, as I already mentioned, we need a group of specialists able to deal with all these aspects in a most efficient way.

ASN : Would you imagine this group including orthopedic surgeons and also engineers or do you prefer a separation of these categories ?

In my opinion, a team of orthopedic surgeons, engineers and researchers is extremely necessary for this kind of work, as their skills are really complementary. Nowadays it seems impossible to imagine a separation between these categories, as each aspect should be quantified with a high precision and accuracy, following a well defined protocol. This is the kind of requirements that can only be fulfilled by a mixed team composed both of biomedical specialists and medical staff.

ASN : As we mentioned engineers, which is in your opinion their role in this field and how would a cohabitation with them work in Romania ? Does it seem possible to you in this moment ?

The collaboration between medical staff and engineers could be possible in Romania, because, in the particular field of orthopedic surgery, we need the help of engineers in several topics - development of accurate analyze devices and software, different diagnosis and follow up tools, surgical planning help and so on. I cited here just some of the urgent needs we address to engineers, but the list could be much longer. The contribution of engineers in this field is essential due to their scientific and mathematical approach, which could only bring accuracy in our somehow intuitive approach.

Pr JIANU and his assistant preparing the SCS instrumentation before surgery

ASN : Have you ever thought of the set up of a national center dedicated to the training of orthopedic surgeons on the treatment of pathologies like scoliosis and other spinal deformities ?

This would be an excellent initiative as such a center would join all orthopedic surgeons wanting to specialize in the treatment of spinal pathologies. The technical staff should in this case bring together not only the orthopedic surgeons, neurosurgeons and medical staff in general, but also biomedical engineers and specialists in kinesytherapy and rehabilitation.
The training should be in a first time mostly theoretical and then followed by practical sessions with participation of the fellows to surgeries.

ASN : You became a member of the ARGOS Association some time ago. How did you get in contact with this association and what made you become a member ?

I "met" the ARGOS Association on the Internet and I could make myself an idea about their activities. Then I participated to the ARGOS Symposiums in Paris which allowed me not only to better understand the main topics this association is dealing with but also to meet some other members of this association. The communications I attended at these symposiums seemed to me particularly impressive by their scientific rigueur and results of presented studies. I have also noticed that the background of ARGOS members in not necessarily medical, several members being scientific researchers in fields like biomechanics or medical imaging which is probably one of the strong points of this association.

ASN : ARGOS is a relatively young association which promotes communication, training and evaluation in the field of spinal orthopedic surgery. What do you expect from the activity of this association ?

My experience with the ARGOS

association is quite short, I became a member only two years ago, but this time was long enough to appreciate the efforts your association is making in order to facilitate the communication between orthopedic surgeons and biomedical related specialists in order to promote the orthopedic research.
Please allow me to suggest that work shops be added to these extremely interesting symposiums or events organized by geographical region in order to create a practical link between surgeons performing spinal osteosynthesis, which could only be favorable to a continuous exchange and improvement of the surgical practice.

ASN : Finally, which are your short term main projects - research projects or/and professional objectives ?

As I mentioned before, at present I am working on the set up of a structure on a national scale allowing all specialists to monitor the whole pathology. I am also trying to create regional centers of diagnosis, surgical treatment and follow up of scoliosis. As for the orthopedic department of our hospital, we are working a lot on several accreditation programs. As an example, a result of this work is the very recent accreditation of our department for the use of botulinum toxin in the treatment of motor infirmity of cerebral origin. This accreditation given by the Health Ministry is unique in our country.

ASN : And long term projects ?

On a long term basis, I would say that my main objective is to be able to train as much young surgeons as possible on the spinal deformities surgical correction, and I will concentrate my efforts on recruiting mostly pediatric orthopedic surgeons as pediatric orthopedics have been recently separated from pediatric surgery in general. ■

Interview by Anca Mitulescu

Argos News

ARGOS Discussion Forum

The ARGOS Association is pleased to announce to all its members that a discussion forum is now available online on the ARGOS Web site (www.argos-europe.com). The access to the discussion forum is private. The ARGOS Member card gives you the possibility to access the forum by using the personal member code on your card. This forum was created in order to establish a quick and easy communication between all ARGOS members. They can discuss any topic related to their daily clinical activity and even ask for advice to experts in the approach of difficult or atypical cases. For those who would also like to submit a complete medical file to one of the ARGOS experts or to all ARGOS members, we invite you to address your file to Anca MITULESCU (anca@argos-europe.com) who is in charge of contacting the experts, collecting their advice and sending it to you as well as transferring your file on the ARGOS forum so that all ARGOS members could give their advice or take part in the discussion if interested. ARGOS is not responsible of the content of these files, neither of the answers from experts and/or from ARGOS members participating to the discussion.

ARGOS Thesis Award
Rewarding the best thesis in spinal surgery or biomechanics

The Argos Association is launching the “Argos 2002 Thesis Award”. This award is open to all persons registered for the “6th International Argos Symposium”. It will grant a prize of an amount of 1000 euros to the best thesis in spinal surgery or biomechanics of the spine. Your thesis must not have been completed prior to November 1st 1998 and must reach the Argos secretariat, in duplicate, before November 31st 2001. An analysis of the prize winning thesis will be published in the European Journal of Orthopaedic Surgery and Traumatology (EJOST).

Updated addresses

For a more efficient communication between the ARGOS board and the ARGOS members, please keep us informed of any change of address, telephone number and e-mail address if you wish to be kept well informed about our activities and continue to receive the ARGOS Spine News journal. This information should be sent to the ARGOS Secretary Office: Marjorie Salé, ARGOS Secretary : marjorie@argos-europe.com
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Please feel free to contact us whenever you have an interesting topic you would like us to write about in our journal.

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CERVICAL SPINE RESEARCH SOCIETY

EUROPEAN SECTION

XVIII ANNUAL MEETING

June 13-14, 2002

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Dear friends and dear Colleagues

BEING THE PRESIDENT of the Cervical Spine Research Society - European Section is a great honour. Having to organise the next meeting of our Society in Paris is a real challenge. Many aspects anyhow make me think we should all be able to enjoy our common passion for spine.

The meeting place on the left bank of the river Seine is an enjoyable position near to many fascinating places. The Meridien Montparnasse Hotel is probably one of the best modern hotels in our city.

The subject of the meeting “multidisciplinary approaches to the cervical spine“ should help us to understand new concepts and different approaches to it.

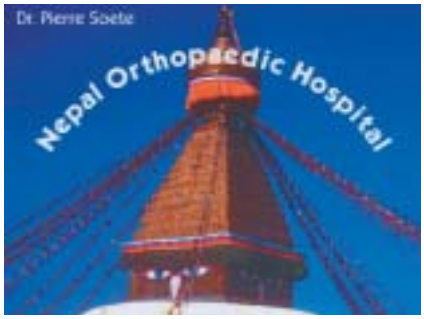
The possibility to share the experience of an oesophagus surgeon as well as a thoracic one is a great opportunity. Famous anatomists, neuro surgeons as well as spine orthopaedic surgeons will share with us their specific knowledge and capabilities to this challenging area of spine.

Different workshops sponsored by the industry will give to the participants the possibility to hands on different innovating implants and techniques.

Free communications and poster presentation will be strongly supported during all the sessions to give us the possibility of increased knowledge and experience. The Gala diner should enable us to discover specific aspects of the Parisian way of life.

I am looking forward to see you in June 2002 in Paris and hope you will enjoy your stay with us.

Christian MAZEL, MD



Nepal Orthopedic
An opportunity to

The Kingdom of Nepal is a country hidden among the highest peaks of Himalayas, with no opening to the sea, situated between Tibet (China) and India.

Variety is the main feature of this country and of the Tibetan people, in the topography and climate, passing from a tropical one in the south to a polar one on the Himalayas peaks, through a continental one in the Katmandu valley. In spite of its agriculture and natural resources, Nepal is still a very pour country: 22 % of new born babies die during their first weeks of life, 3.5 % of children die between the age of 1 to 5. Moreover, the hunger and malnutrition are still part of the rough reality in Nepal. The life hope is of only 58 years and 10 % of the population suffer from different handicaps. 23 % of them suffer from physical handicaps.
In order to pursue the development program, the Nepal government is still highly dependent on the international help.

The Nepal Orthopedic Hospital (NOH) was built in 1995 with funds obtained from the Rotary USA district 7090 (225000 US$) and from the Rotary Club in Patan-Katmandu (60000 US$). The equipment of the hospital was possible due to the Rotary Foundation sponsorship (12800 US$) and to some private donations. The number of hospital beds is of only 20 in this moment.
The Administrative Board is composed by Nepal Disabled Association members, Rotary Clubs members, Nepal government and private donators. Doctor ANIL SHRESTHA is the medical director of the hospital.
The hospital started its activity in August 1998 (first consultations) and in October 1998 the medical staff performed the first surgery. Since then, the activity doubled during the first year and is continuously increasing.
The NOH is provided with a prosthesis manufacture department, a physiotherapy service and a social service. The NOH organizes visits and on field medical care in several villages where there are no medical care structures. The hospital is open to everybody and medical care is provided for free to poor population.
In this context, Dr Pierre SOETE, one of the founders of the Orthopedics and Trauma Department of the St Joseph Clinic in Mons, Belgium, and practitioner at the St Luc, University Clinic, Wavre, Belgium highly experimented in orthopedic, trauma and prosthetic surgery of the knee, the hip,

TIBET - General Features :

Demography:	22 million inhabitants
Alphabetization:	38%
Politics:	Democracy
Economy:	Agriculture (99% of the population live in the countryside) Tourism
Health:	1 physician for 15000 inhabitants 1 orthopedic surgeon for 600000 inhabitants 4768 hospital beds

Hospital : bring your support

the spine and the shoulder decided to bring his personal and professional support to the development of the Nepal Orthopedic Hospital Project, by joining the surgical team of this hospital, under the direction of Dr Anil SHRESTHA, in September 2000.

His 25 year experience in the orthopedic and trauma surgery allows him not only to help Nepal surgeons acquire and master modern surgical techniques but also to develop new ones, adapted to the specific needs of the Nepal population.

Indeed, Nepal medical staff face a lot of difficulties when trying to fulfill or complete their training abroad because of low financial means. Besides, the orthopedic and trauma surgery is a very young discipline in Nepal and therefore the lack of specialists in this field is quite important.

The huge motivation of the orthopedic surgeons working in this hospital to reach a complete medical and financial autonomy encouraged Dr SOETE to double his efforts and energy in order to fulfill his humanitarian mission in this country. In complement of his medical activity in this hospital, he proceeded to a complete analysis of all factors that could increase the financial autonomy of this institution.

He established a report on the financial situation of the hospital and also made some suggestions that could insure the autonomy if put into practice.

He started searching for medical equipment and could find almost all essential devices for the orthopedic and trauma surgery that he acquired from Belgium hospitals. All devices have already been verified from a technical point of view and delivered to the Nepal Orthopedic Hospital.

An important factor that would ensure the financial autonomy of this hospital is the increase of the number of beds from 20 to 50 beds. Only 30 more hospital

beds could help the hospital become an independent institution with regard to international aid, which is not always predictable and therefore might affect the activity of the hospital staff. This increase of the number of beds would also be followed by an increase of the number of medical staff, from 33 to 59 members.

This might seem very easy to put into practice when living in a developed society, but it is a very hard nut to crack for Nepal medical and administrative staff.

Therefore, ARGOS association invites, on behalf of Dr SOETE, all our partners as well as all those who read our journal to take the opportunity to support this project by any possible means (information, assistance, consultancy, material support, sponsorship of one or more hospital beds).

EUROSURGICAL, one of our industrial partners has already established an agreement with the Nepal Orthopedic Hospital for the complete sponsorship of 1 hospital bed (250 € per month).

Let this initiative be followed by several similar actions from all those who can help the Nepal Orthopedic Hospital become a modern and fully autonomous medical care center. ■

Anca Mitulescu

All sponsoring should be addressed to :

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or transfered on the account hereafter:

Account N°: 220-0786941-16
With the mention
“Nepal Orthopedic Hospital - Doctor SOETE”

In the dictionary, Comprehension comes before Surgery

Reading this issue of our journal, entirely dedicated to scoliosis, one would probably be deceived not to find a word on the brilliant ideas of great people like Jean Dubousset, Yves Cotrel, Ginette Duval Beaupère or René Perdriolle, great surgeons but also researchers in the wide field of scoliosis study. We would therefore like to bring here a humble reminding of the ideas of these people who dedicated their lives to the complete study of scoliosis, under its complex aspects. They all began their carrier as clinicians of the spine, but soon after their way of thinking started to revolution the research in the field of spinal pathologies, especially scoliosis. They were among those who looked more towards the comprehension of the causes of the idiopathic scoliosis before making a choice with regard to the treatment, either conservative or corrective, of this pathology.

"HOW can I explain to a patient suffering from scoliosis, having a double major curve that he is going to be operated while a similar patient, with exactly the same curve, with an identical follow-up and conservative treatment, will probably never need to get into the operation room ?" says Dr Dubousset.

The answer to this dilemma stands in the evolution factors of the idiopathic scoliosis, which still remain a hard nut to crack. Indeed, for two patients, suffering from similar idiopathic scoliosis, having practically the same Cobb angles at the beginning of the follow-up, one will develop a quick evolution of the curves while the other will keep perfectly stable.

So, WHY such a paradox and HOW can it be explained ? We are not here to answer to this question, but to give to our readers a quick look to the path these researchers followed in order to first of all bring up this question and furthermore approach all possible answers.

One of the major features of scoliosis is its three dimensional aspect. It might seem obvious today, but one should not neglect that it used to be considered like a "crazy" idea just some thirty years ago when Dr. Perdriolle, Pr. Dubousset, and Dr. Duval Beaupère started to claim it and to try to find reasonable solutions to what could have been called an ill posed problem until that time. One should not forget that the Harrington surgical technique is still applied to scoliosis in several countries all over the world in spite of the fact that this technique, as revolutionary as it was at its time, completely neglects the 3D aspect of the deformity.

In 1979, Dr. Perdriolle dedicated a whole book to the three dimensional aspect of scoliosis, but at that time he did not have the modern technologies that would have probably helped him prove his theory.

Some years later, Pr. Dubousset and Dr. Duval Beaupère, helped by an engineer - Jérôme Hecquet - put into practice a computer based analysis tool allowing them to evaluate 3D features of the scoliotic curvature. This tool provided the surgeon with only a qualitative evaluation, but it opened the way to long discussions on the topic. The fruit of these analyses was the development of new research projects focused on the 3D aspect and treatment of scoliosis. Almost three decades of research resulted in revolutionary quantitative analysis tools, such as stereoradiographic 3D reconstruction and modeling of the healthy and pathological spine and pelvis, opto-electronic and X ray based tools for the analysis of the balance of scoliotic patients and so on.
All these tools were not meant to allow a direct diagnosis or treatment, although very useful in the quantitative analysis for the choice of the corrective actions, but mostly to better understand the phenomena by standardized exams.

Another major idea that these researchers tried to teach to the new generation of surgeons is that the most important factor in their work will always be the PATIENT. Each patient is unique and one should never experience a new treatment strategy or surgical technique directly on patients. Therefore, engineering came to join the medical research as a new discipline - Bio Engineering and/or Biomedical

Engineering. Its role was to suggest, develop and validate new tools that could allow the surgeon to have a personalized quantitative and qualitative approach for each patient and also to allow a decrease of the surgery risks by pre-operative numerical simulations of corrective actions.
New technologies can be applied nowadays to scoliosis due to efforts of people like Yves Cotrel, Jean Dubousset, Ginette Duval Beaupère, René Perdriolle who, by their rich experience, put the basis of many research studies in this field.

Engineers and researchers like François Lavaste, Wafa Skalli, Guy Viart, Jerôme Hécquet and many others, joined their know-how to putting into practice and evaluating all these analysis tools, spinal implants and modern technologies in order to help these surgeons in their daily work.

«Learn from any atypical case» - would probably be another advice to the young generation of orthopedic surgeons, because each atypical case would strengthen and enlarge the notion of normality and abnormality and therefore help the surgeon decide whether an atypical behavior is or is not linked to a pathology and find the appropriate solution for EACH patient.
On this topic, Dr Duval Beaupère dedicated her entire professional life to the study of spinal and pelvic parameters of healthy and pathological cases. Her work is a treasure left in heritage to the generations to come in order to open their eyes on the notion of normal and abnormal balance.

By their joined work, Pr Dubousset and Dr Duval Beaupère proved that the spine cannot be dissociated from the pelvis, its very basis, in terms of balance. Their work yielded a new definition of the pelvis as The Pelvic Vertebra. The advances in the study of the evolution of species supported their theory by showing that one of the major factors that determined the bipedal posture of humanoids was the evolution of the pelvis, which ensured a stable balance of the trunk in the passage from the quadripedal stance to the bipedal one.

Another aspect that is nowadays one of the major concerns of all orthopedic surgeons confronted to the idiopathic scoliosis treatment is the protection of the patient, usually very young, with regard to the risks of the clinical examination. X-ray based exams are essential for the scoliotic patient follow-up but they are not completely safe when repeated at short intervals. Fundamental physics research on ionizing particles detection offers now new perspectives to the approach of this problem. Indeed, new alternatives to the conventional X ray and CT scan are now available by the low dose digital X ray devices. But a particularly innovative one is the so-called Charpak device, a new low dose digital X ray device recently developed by the BIOSPACE company based on an original idea of Pr G Charpak multiwire detectors chamber (Physics Nobel Prize in 1992). This new technology is quite revolutionary as it allows a higher detection of particles and therefore a better quality of the X ray image with a much lower X ray dose (10 to 30 times lower with regard to conventional X rays). This device was developed in parallel to the development of the clinical

protocols of 3D personalized reconstruction and geometrical modeling by stereoradiography and will soon allow precise 3D analysis and surgical planning for scoliosis correction.
One could ask why we talk about this project here. Just because this project would have probably never got out from the research lab towards the clinics if it had not had the total support and encouragement of Pr. Dubousset and Pr Kalifa (St Vincent Hospital in Paris) who initiated and continuously followed its development during the last ten years.

All the topics we mentioned here might seem obvious and well accepted nowadays but they seemed only utopias some thirty years ago.

The most extraordinary achievement of people like Pr. Dubousset, Dr. Duval Beaupère, Dr. Perdriolle and others like them was to open the path towards a new way of thinking about scoliosis, towards the understanding of phenomena before choosing a treatment.

At the time when brilliant mechanical engineers like François Lavaste were shun away because they dared say that engineering could and should help clinics, Pr. Dubousset, Dr. Duval Beaupère, Dr. Perdriolle listened to their "utopist" ideas and oriented their efforts towards strong co-operations with engineering researchers.

They not only listened to their ideas, but also believed in, at a time when calculating the slightest parameter by means of a computer used to take days. But their long vision and their wish to overcome the impossible (or the not-yet-possible) strengthened their patience and resulted in what we call today "modern technologies" applied to clinical analysis and surgery.
This is the precious heritage these people are leaving to us: a new way of thinking, a new way of looking towards the future through comprehension and thorough study of the unknown. ■

Anca Mitulescu

Bibliography

1 Cotrel Y, Morel G, Rey JC: Idiopathic scoliosis. Acta Orthop Belg 1965 Sep-Oct;31(5):795-810

2 Cotrel Y: Correction-fusion techniques in the treatment of idiopathic scoliosis. Acta Orthop Belg 1967 Jul-Oct;33(4):640-8

3 Cotrel Y, Dubousset J : A new technique for segmental spinal osteosynthesis using the posterior approach. Rev Chir Orthop Reparatrice Appar Mot 1984;70(6):489-94 Cotrel Y: Proceedings: Traction in the treatment of vertebral deformity. J Bone Joint Surg Br 1975 May;57(2):260

4 Cotrel Y: A new technique of correction and fusion. Isr J Med Sci 1973 Jun;9(6):759-66

5 Dubousset J, Queneau P, Lacheretz M : Diagnostic problems poses by stiff and painful scoliosis in children.Rev Chir Orthop Reparatrice Appar Mot 1971 Apr-May;57(3):215-26

6 Dubousset J: Orthopedic disorders of the spine. Soins Chir 1983 Oct;(32):10-5

7 Dubousset J: Editorial scoliosis and its pathophysiology: do we understand it? Spine 2001 May 1;26(9):1001

8 Dubousset J: Idiopathic scoliosis. Definition—pathology—classification—etiology. Bull Acad Natl Med 1999;183(4):699-704

9 Duval-Beaupere G, Grossiord A: Contribution of poliomyelitic scoliosis to the study of idiopathic scoliosis. Acta Orthop Belg 1967 Jul-Oct;33(4):575-86

10 Duval-Beaupere G, Dubousset J, Queneau P, Grossiord A : A unique theory on the course of scoliosis. Presse Med 1970 May 23;78(25):1141-6 passim

11 Duval-Beaupere G: Maturation indices in the surveillance of scoliosis. Rev Chir Orthop Reparatrice Appar Mot 1970 Jan-Feb;56(1):59-76

12 Duval-Beaupere G: The growth of scoliotics. Hypothesis and preliminary study. Acta Orthop Belg 1972 Aug;38(4):365-76

13 Duval-Beaupere G: Growth of the trunk and lower limbs after the menarche. Rev Chir Orthop Reparatrice Appar Mot 1976 Jul-Aug;62(5):501-9

14 Duval-Beaupere G: Surveillance, course, and prognosis of scoliosis. Rev Prat 1982 Nov 11;32(51-52):3261-4, 3269-71

15 Duval-Beaupere G, Barthel F: Growth in scoliotics. Rev Chir Orthop Reparatrice Appar Mot 1983;69(3):201-6

16 Duval-Beaupere G, Lespargot A, Grossiord A: Scoliosis and trunk muscles. J Pediatr Orthop 1984 Mar;4(2):195-200

17 Duval-Beaupere G, Lespargot A, Grossiord A: Flexibility of scoliosis. What does it mean? Is this terminology appropriate? Spine 1985 Jun;10(5):428-32

18 Duval-Beaupere G, Lamireau T : Scoliosis at less than 30 degrees. Properties of the evolutivity (risk of progression). Spine 1985 Jun;10(5):421-4

19 Duval-Beaupere G, Robain G: Visualization on full spine radiographs of the anatomical connections of the centres of the segmental body mass supported by each vertebra and measured in vivo. Int Orthop 1987;11(3):261-9

20 Duval-Beaupere G: Rib hump and supine angle as prognostic factors for mild scoliosis. Spine 1992 Jan;17(1):103-7

21 Duval-Beaupere G, Schmidt C, Cosson P: A Barycentremetric study of the sagittal shape of spine and pelvis: the conditions required for an economic standing position. Ann Biomed Eng 1992;20(4):451-62

22 Duval-Beaupere G: Measurement of gibbosity and recumbent angle as a prognostic factor in juvenile scoliosis. Acta Orthop Belg 1992;58 Suppl 1:26-

22 Duval-Beaupere G: Threshold values for supine and standing Cobb angles and rib hump measurements: prognostic factors for scoliosis. Eur Spine J 1996;5(2):79-84

23 Graf H, Hecquet J, Dubousset J: 3-dimensional approach to spinal deformities. Application to the study of the prognosis of pediatric scoliosis. Rev Chir Orthop Reparatrice Appar Mot 1983;69(5):407-16

24 Hecquet J, Legaye J, Duval-Beaupere G: Access to a three-dimensional measure of vertebral axial rotation. Eur Spine J 1998;7(3):206-11

25 Kalifa G, Charpak Y, Maccia C, Fery-Lemonnier E, Bloch J, Boussard JM, Attal M, Dubousset J, Adamsbaum C: Evaluation of a new low-dose digital x-ray device: first dosimetric and clinical results in children. Pediatr Radiol 1998 Jul;28(7):557-61

26 Legaye J, Duval-Beaupere G, Hecquet J, Marty C: Pelvic incidence: a fundamental pelvic parameter for three-dimensional regulation of spinal sagittal curves. Eur Spine J 1998;7(2):99-103

27 Lavaste F, Skalli W, Robin S, Roy-Camille R, Mazel C: Three-dimensional geometrical and mechanical modelling of the lumbar spine. J Biomech 1992 Oct;25(10):1153-64

28 Perdriolle R : La scoliose : son aspect tridimensionnel; Ed. Maloine; 1979, Paris

29 Perdriolle R, Becchetti S, Vidal J, Lopez P Mechanical process and growth cartilages. Essential factors in the progression of scoliosis. Spine 1993 Mar 1;18(3):343-9

30 Perdriolle R, Vidal J: Morphology of scoliosis: three-dimensional evolution. Orthopedics 1987 Jun;10(6):909-15

31 Perdriolle R, Vidal J: Thoracic idiopathic scoliosis curve evolution and prognosis. Spine 1985 Nov;10(9):785-91

32 Perdriolle R, Vidal J: A study of scoliotic curve. The importance of extension and vertebral. Rev Chir Orthop Reparatrice Appar Mot 1981;67(1):25-34

33 Ployon A, Lavaste F, Maurel N, Skalli W, Dubousset J, Zeller R, Rolland Gosselin A: A protocol of in vivo 3D experimental evaluation of global posture and motion of the spine. Rev Chir Orthop Reparatrice Appar Mot 1997;83(8):719-29

34 Salanova C, Dubousset J, Moreno P, Boulot J : Segmental instrumentation in idiopathic scoliosis. Role of the upright frontal plate for determination of the area of fusion. Rev Chir Orthop Reparatrice Appar Mot 2000 Sep;86(5):441-51

35 Skalli W, Robin S, Lavaste F,Dubousset J: A biomechanical analysis of short segment spinal fixation using a three-dimensional geometric and mechanical model. Spine 1993 Apr;18(5):536-45

36 Skalli W, Lavaste F, Descrimes JL : Quantification of three-dimensional vertebral rotations in scoliosis: what are the true values? Spine 1995 Mar 1;20(5):546-53

History of Posterior Surg in the Treatment of Scoli

THE CONCEPT of posterior spinal fusion as a stabilisation technique for the deformed spine appears in the early 1900's. The procedures of auto bone graft placed within the split spinous processes were reported by Albee(1) in 1911 with bone graft from tibiae and by DeQuervain and Hoessly(9) in 1917 with bone graft from scapula.
The application of spinal fusion to scoliosis was performed in 1914 by Hibbs(15). He used head-pelvic traction to obtain correction and 6 to 12 month bed rest, wearing a post operative cast.

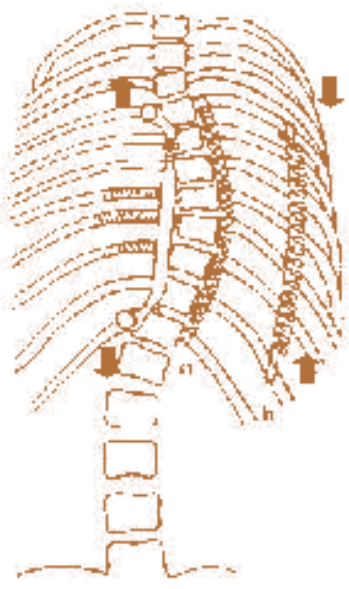

Figure 1 : Mechanical principles of Gruca's technique

Since the 1930's, cast correction associated to spinal fusion was widely used and improvements in fusion and casting appeared in the 1950's.
In 1953, Risser well known for his iliac apophysis sign(26) (vertebral growth), developed the localizer cast(25) for postoperative ambulation. The same mechanical principles were applied in the Milwaukee brace. This brace was initially designed in 1958 by Blount and Schmidt(3) for post operative immobilization but is generally used for non operative correction. In 1958, Moe(21) described his facet fusion technique to reduce the pseudoarthrosis rate and advised to use side bending radiographs to measure the flexibility of the lumbar curve. This completed the Cobb's measuring of the curve magnitude(5) in frontal X ray films described in 1948.

As early as 1910, Lange(17) used steel rods attached to the spinous processes by wires in the treatment of tuberculosis kyphosis and spondylolytic spine. This procedure was spread by Wilson using double plates(6) on both sides of spinal processes. But the first generation of internal fixation capable to give a correction was born in 1962 with Harrington's system(13).
He was influenced by Allan's work(2), reporting in 1955, an expanding device placed between the transverse processes. The same principles were combined with springs fastened to the

Figure 2 : Mechanical principles of Harrington's technique

convex side to transverse processes or ribs, as reported by Gruca(12) in 1958 (figure1).

The Harrington's vision was a "dynamic correction system", imagined at the beginning without additional spinal fusion. The fixation provided a good

Figure 3: Harrington's technique modified by Armstrong

ical Techniques
osis

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stability, but rapidly the necessity of fusion and plaster immobilization became essential. The quite good frontal correction given by this technique was afterwards confronted with the bad sagittal plane effect well known today as "flatback syndrome"(18) (figure2).
During the 1970's and beginning of the 1980's, this concave distraction rod technique was widely used and modified in order to improve the stability and the corrective effect, including a convex compression rod described by Harrington(14) in 1973, a transverse traction device(31) investigated by Cotrel, in 1973, and square-end rod and hooks modified by Moe(22), in 1980. The last Harrington modified construct was imagined by Armstrong, his double rod system(27) with concave and convex distraction (figure 3).

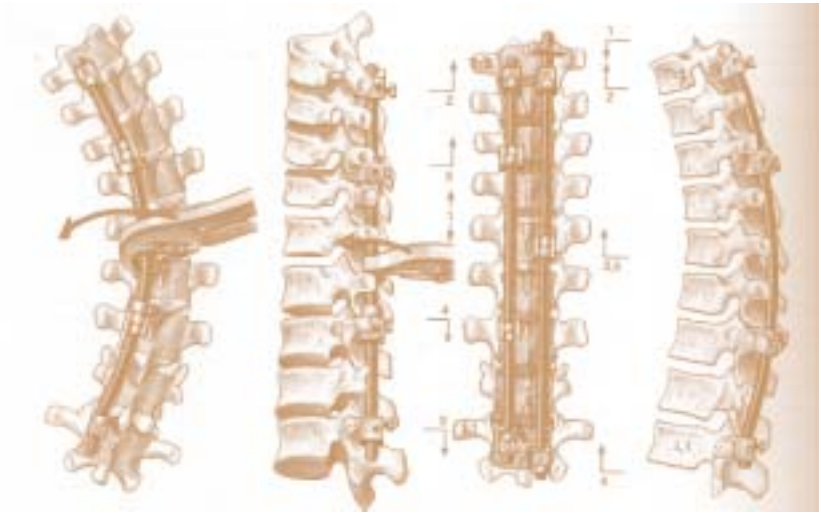


Figure 5: Mechanical principles of Cotrel's and Dubousset's technique

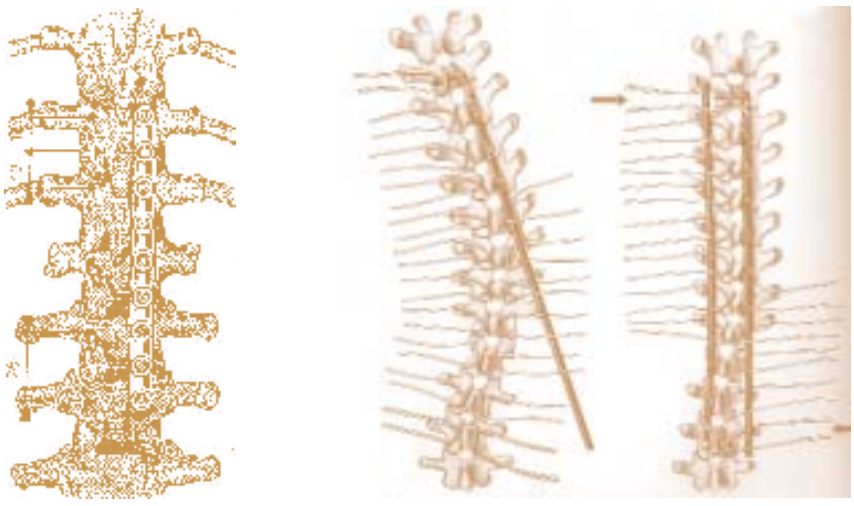
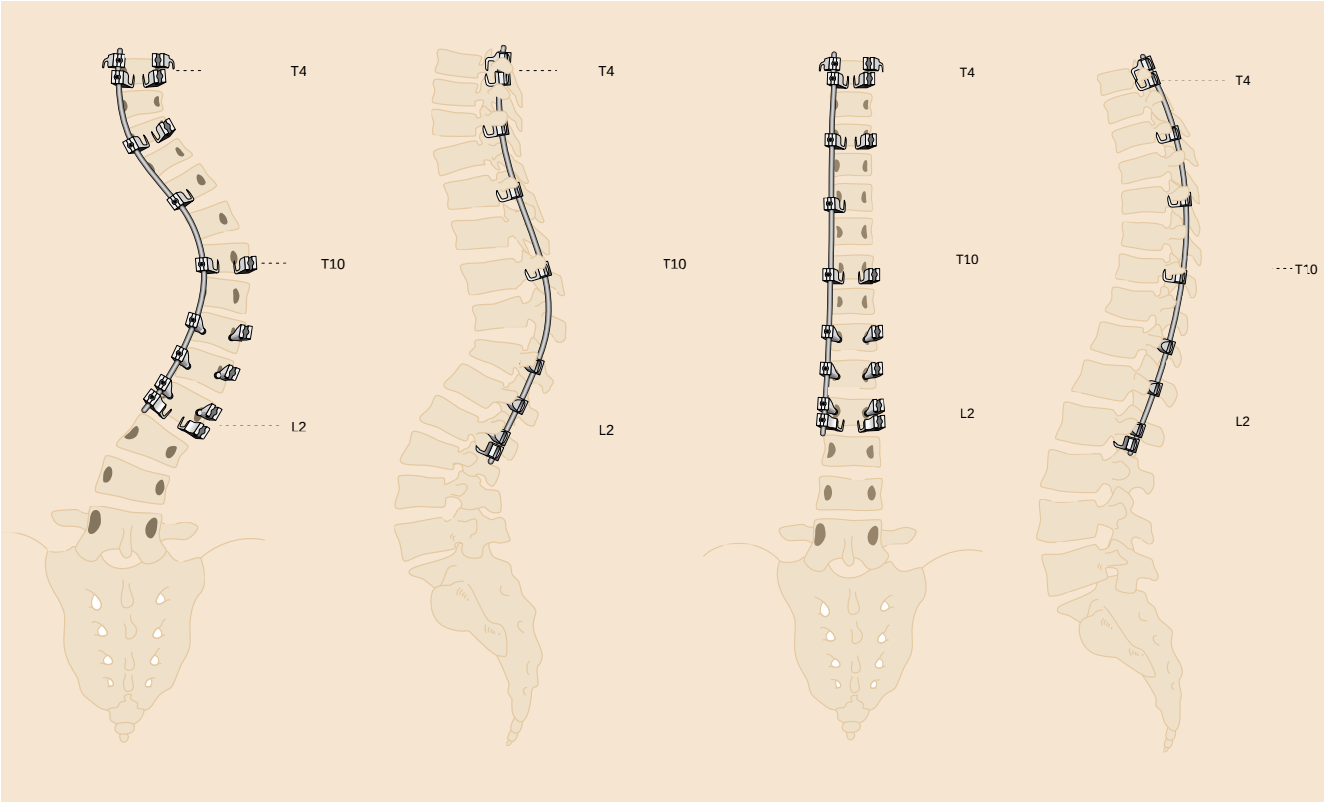


Figure 4: Mechanical principles of Lucque's and Resina's technique

In the same period, Moe also developed halo-femoral traction for correction of severe curves. Vauzelle and Stagnara(30) investigated, in 1973, the intraoperative wake-up test to monitor the spinal cord function and somatosensory evoked potentials(23) were further reported in late 1970's. The intraoperative blood recovery was also introduced in spinal surgery(10) at the end of the 1970's (ancestor of the actual cellsaver).
The first multi-segmental and bilateral spinal fixation appeared in April 25th, 1963 with the Roy-Camille's plate technique(28), first used in a case of



Figur 6: Mechanical principles of the in situ contouring technique

spinal fracture previously operated by laminectomy. Laminae missing, he proposed the first pedicular screwing.
The second generation of multisegmental instrumentation, was pioneered in scoliosis by Resina(24) and promoted, in the mid 1970's, by Luque(20). This translation technique using sublaminar wires and pre-contoured rods was strong enough to avoid post operative immobilization.
These two multisegmental techniques introduced the principle of two-plane correction while maintaining or improving of the sagittal plane(4) curvatures (figure 4).

January, 21st 1983, Cotrel and Dubousset(7)(8) put their revolutionary instrumentation with open hooks. They rotated for the first time the concave rod to medialize the apex and to restore a physiological profile. The original idea was to design a new instrumentation with two rods and many hooks, strong enough to avoid any postoperative brace. In this third generation of instrumentation, they included the device for transverse traction (DTT) and introduced open implants.
The rod derotation technique corresponds to the first attempt to three-dimensional correction (figure 5). With follow-up and experience of many cases operated around the world, most of the investigators reported in the literature(11)(19) limited correction in the axial plane.

Since the 1990's, the fourth generation of segmental instrumentation has been developed. These systems consist of multi hooks/screws and solid rod and deal with different surgical techniques: compression-distraction, translation, rod rotation and in-situ contouring.

The in-situ contouring technique was developed by Jackson(16) in late 1980's to correct the loss of lordosis in lumbar fractures. The same principles were adapted to scoliosis(29) and the correction is obtained directly on the malleable rod by bending maneuvers in the different planes (figure 6)
Nowadays, the concepts of Risser Sign, Cobb angle and lateral bending are regularly applied in scoliosis diagnosis, to decide whether bracing treatment or surgical correction should be adopted.
The intraoperative wake-up test, the cellsaver and the evoked potentials are regularly used in operation room
Modern instrumentation includes open hooks and screws, bilateral rods and devices for transverse links. They are associated to spinal fusion and different surgical techniques for the reduction: compression-distraction, translation, rod rotation and in situ contouring . ■

Bibliography

1 Albee F. Transplantation of a portion of the tibia into the spine for Pottis disease: a preliminary report. JAMA, 1911; 57:885-886

2 Allan FG. Scoliosis operative correction of fixed curves. J Bone Joint Surg [Br], 1955; 37B: 92-96

3 Blount WP., Schmidt AC., Keever ED. and Leonard ET. The Milwaukee brace in the operative treatment of scoliosis. J Bone Joint Surg [Am], 1958; 40: 511-525

4 Bradford DS, Blatt JM, Rasp FL. Surgical management of severe thoracic lordosis. A new technique to restore normal kyphosis. Spine, 1983; 8(4):420-428

5 Cobb JR. Technique for study of scoliosis. American Academy of Orthopedic Surgeons Instructional Course Lecture, 1948; 5: 261-275

6 Cobey MC. The value of Wilson plate in spinal fusion. Clin Orthop, 1971; 76: 138-140

7 Cotrel Y. and Dubousset J. Nouvelle technique d'ostheosynthese rachidienne segmentaire par voie posterieure. Revue de Chirurgie Orthopédique, 1984;70: 489-494

8 Cotrel Y., Dubousset J. and Guillaumat M. A new universal instrumentation in spinal surgery. Clin Orthop, 1988; 227: 10-23

9 DeQuervain F. and Hoessly H. Operative immobilization of the spine. Surg Gync Obs, 1917; 24: 428-436

10 Csencsitz TA. and Flynn JC. Intraoperative blood salvage in spinal deformity surgery in children. J Fla Med Assoc, 1979; 66: 39-41

11 Gray JM., Smith B., Ashley RK., LaGrone MO. And Mal J. Derotational analysis of Cotrel-Dubousset instrumentation in idiopathic scoliosis. Spine; 16 (8S): 391-393

12 Gruca A. The pathogenesis and treatment of idiopathic scoliosis. J Bone Joint Surg,1958; 40A(3):570-584

13 Harrington PR. Treatment of scoliosis. Correction and internal fixation by spinal instrumentation. J Bone Joint Surg [Am], 1962; 44: 591-610

14 Harrington PR. and Dickson SH. An eleven year clinical investigation of Harrington instrumentation. A preliminary report of 578 cases. Clin Orthop, 1973; 93:113-130

15 Hibbs RA. A report of fifty-nine cases of scoliosis treated by fusion operation. J Bone Joint Surg,1924; 6(1):3-19

16 Jackson R. P., Jackson sacral fixation and contouring spinal correction techniques. In "Lombosacral and spinopelvic fixation" Lippincott-Raven Publishers, Philadelphia, 1996, 357-379

17 Lange F. Support for the spondylolytic spine by means of buried steel bars attached to the vertebrae. Am J Orth Surg, 1910; 8: 344-351

18 Lagrone MO, Bradford DS, Moe JH, Lonstein JE, Winter RB, Ogilvie JW. Treatment of symptomatic flatback after spinal fusion. J Bone Joint Surg [Am], 1988; 70(4):569-580.

19 Lenke LG, Bridwell KH, Baldus C, Blanke K. Analysis of pulmonary function and axis rotation in adolescent and young adult idiopathic scoliosis patients treated with Cotrel-Dubousset instrumentation. J Spinal Disord, 1992; 5(1): 16-25.

20 Luque ER. Segmental spinal instrumentation for correction scoliosis. Clin Orthop, 1982; 163:192-198

21 Moe JH. A critical analysis of method of fusion for scoliosis: an evaluation of two hundred and sixty six patients. J Bone Joint Surg, 1958; 40: 529-554

22 Moe JH. Modern concepts of treatment of spinal deformities in children and adults. Clin Orthop, 1980; 150:137-153

23 Nash CL Jr., Loring RA., Schatzinger LA. and brown RH. Spinal cord monitoring during operative treatment of the spine. Clin Orthop, 1977; 126: 100-105

24 Resina J. and Alves AF. A technique of correction and internal fixation for scoliosis. J Bone Joint Surg [Br], 1977; 59(2): 159-165

25 Risser JC., Lauder CH., Norquist DM. and Cruis WA. Three types of body casts. American Academy of Orthopedic Surgeons Instructional Course Lecture, 1953; 10: 131-142

26 Risser JC. The iliac apophysis: an invaluable sign in the management of scoliosis. Clin Orthop, 1958; 11:111-119

27 Romana C. Michel CR. Dimnet J. Berard J. and Caton J. Le montage Armstrong dans la chirurgie de la scoliose. Etude clinique, biomécanique et tridimensionnelle. Rev Chir Orthop, 1985 ; 71 :111-118

28 Roy-Camille R. and Petchot P. Le traitement des traumatismes du rachis dorsal et lombaire par plaques posterieures vissées dans les pédicules. Acta Orth Belg,1991; 57 (sup I): 184-190

29 Steib JP., Averous C. and Lang G. Traitement chirurgicaux des scolioses par deux techniques de correction différentes. Presented at the Groupe d'Etude de la Scoliose 26th Annual Meeting Dijon France, March 1995

30 Vauzelle C., Stagnara P. and Jouvinroux P. Functional monitoring of spinal cord activity during spinal surgery. J Bone Joint Surg, 1973; 55: 441

31 Wolf AW., Brown JC., Bonnett CA., Nordwall A. and Sanderson R. Transverse traction in the treatment of scoliosis. A preliminary report. Spine 1981;6(2) : 134-138

As every year, the 6th ARGOS Meeting will take place at the "Salons des Arts & Métiers" in Paris. This beautiful private parisian mansion seems to adapt perfectly to the meeting spirit. Indeed, it favours conviviality, exchange of views and dialogue. The symposium will last from Thursday afternoon to Friday Morning. Friday afternoon will be devoted to free communications.

To give the good indication of a lumbar or lumbo-sacral fusion is the guarantee of a good functionnal and clinical result. This is the key point of the treatment. Several schools, even philosophies are opposite in this field. However, it is certainly possible to access to a rather common attitude. That's why we wish to have the opinion of few of you to help us to define easily what can be considered as the "good indication".

The second point that highly contributs to the quality of the result is the surgery's strategy. Which levels are to be fixed? What kind of fusion to do? These are important factors, which will influence the results. The topic is wide, source of many questions and examinations. This year, we only wish to discuss the indications and the surgery's strategy in the treatment of lumbar stenosis associated to an adult scoliosis or/and or to an arthritic spondylolisthesis, as well as in isthmic lysis and grade one spondylolisthesis. The years 2003 and 2004 will allow us to study the other indications of fusion as regards of the common or post-discectomy low back pain, the disc herniation the multi operated spine and high grade spondylolisthesis. We hope to have the pleasure to meet you during these next meetings. ■

Argos' symposium

> January 31st, 2002

13h20 to 17h30

and February 1st, 2002

08h00 to 12h00

Free communications

> February 1st, 2002

14h00 to 16h00

The lumbar and lumbo-sacral degenerative spine

Scientific committee :

Dr Philippe BEDAT
Dr Jean-Paul FORTHOMME
Dr Frank GOSSET
Dr Alain GRAFTIAUX
Pr Pierre KEHR
Dr Christian MAZEL
Pr Jean-Paul STEIB
Dr/Ing Alexandre TEMPLIER
Dr Richard TERRACHER

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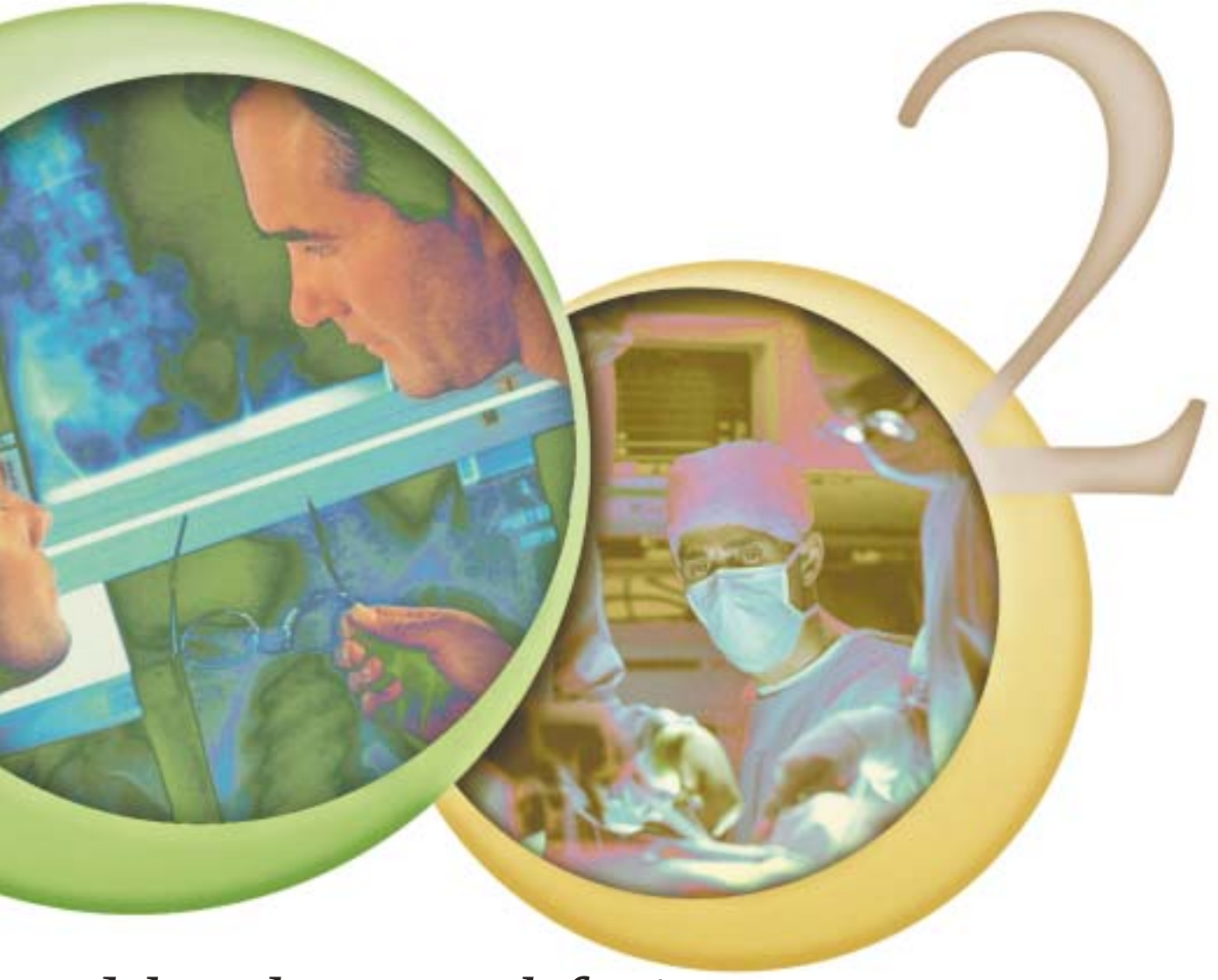

and lumbo-sacral fusions :
dications, which strategies ?

stenosis associated to spinal deformities,
c lysis and grade one spondylolisthesis.

Simultaneous translation
French ⇔ English

ARGOS

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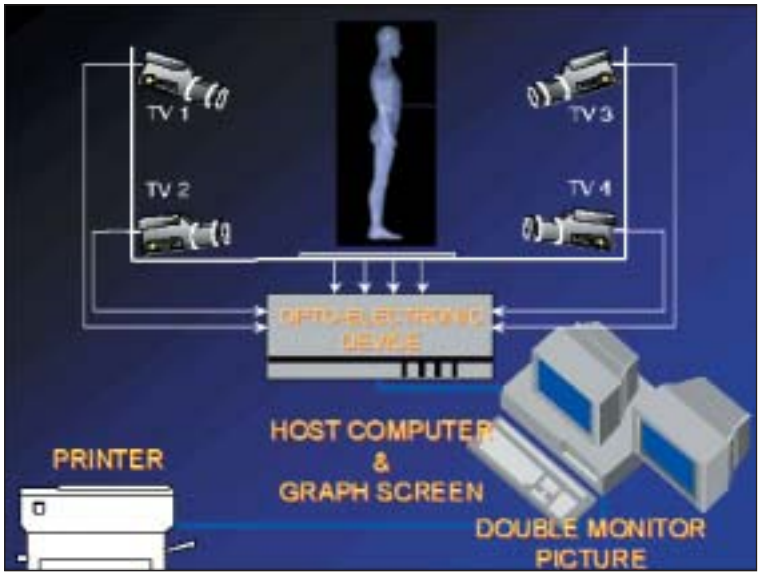
Interview with Dr.

Scientific Director of the research and diagnostic center Centro
General Manager of Bioengineering & Biomedicine Company (P

ASN : Mr D'Amico, you recently applied for becoming an ARGOS Member. Which was your motivation in this choice ?

Well first of all let me thank you and all the Editorial Staff of the ARGOS Spine News for giving me this opportunity to talk to the ARGOS scientific community about the 3D measurement opto-electronic approach for evaluation of Spine deformities and Posture.
The last ARGOS Forum and Meeting of January in Paris was my first contact with this very stimulating and warm community. I had the opportunity to follow very high level presentations and debates and at the same time I felt myself as if I were among old friends with which to discuss and to exchange experiences and doubts. This is why I immediately asked to have the possibility to become a member of the ARGOS association. So I feel myself very honoured to receive this interview.
In 1994, I got the opportunity to organize and chair the 2nd International Symposium on 3D Scoliotic Deformities combined with the 8th International Symposium on Surface Topography and Spinal Deformity in Pescara. I'm very proud to remind that during this International Symposium the International Research Society of Spinal Deformities (IRSSD) was founded. This society merges Surgeons, Engineers and Scientists of different fields the main interest of whom is to study Spine and the related pathologies. There are a lot of common points between ARGOS and IRSSD and I think a contact between the two scientific communities will for sure bring new stimulating opportunities. I intend to work on this topic to investigate any possible communication and/or common actions.



General protocol for the analysis of the posture by means of opto-electronic devices

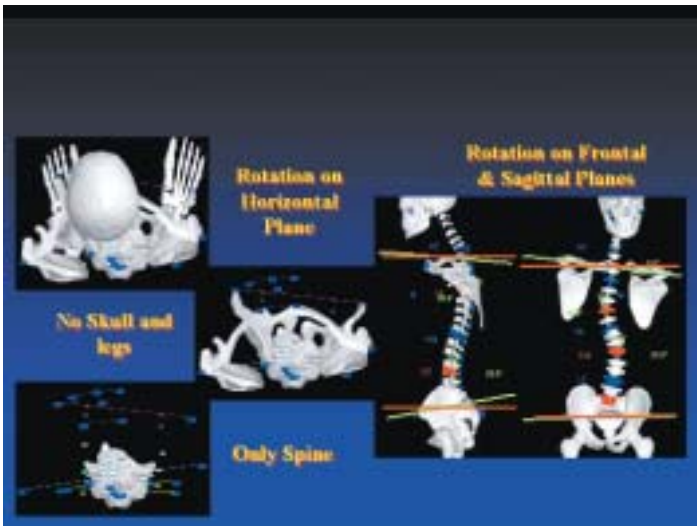
ASN : From your work experience it arises you have been and are involved in a quite spread activity approaching several different fields and research topics, how do you manage it?

Yes it is true! I approached many different topics and looking back, I consider myself very lucky. In fact at the beginning there had been two favourable occurrences that helped me a lot and pushed me to increase my own experience in Bioengineering field very quickly. The first was to have some experience in signal processing and data analysis, the second to study and to work at Centro di Bioingegneria Fondazione Pro-Juventute Don Gnocchi - Politecnico di Milano CBI . In fact when I started to work on the LAMBDA algorithm, that I published more than 10 years ago, I had to study a lot in order to improve my learning and to reach some specialisation and experience in the basic discipline of "signal processing". The signal processing techniques are very general and they are applicable in all the fields where the analysis of some 1D , 2D, 3D etc. signal is necessary. The LAMBDA algorithm itself is a very basic and general one. It can be used in different fields both to estimate velocities and accelerations from space trajectories and to obtain the 3D spine shape from a number of measured positions or even

Eng. Moreno D'Amico

Valutazione Patologie Vertebrali (CEPAV)- Riabilitazione S.Stefano escara)

in image processing for X-Ray analysis, so I was asked to use it in multiple situations and this just put me in a real favourable situation to "grow up". In fact working at the CBI where a lot of projects were continuously developed I was asked to participate to many national, European and international projects. Consequently I had also the possibility to approach various issues in several different fields - rehabilitation topics concerning movement and posture analysis both in neuromotor control and orthopaedics, as well as in the study of the optimisation of sport performances or even in sport shoes design. Of course my direct involvement in so many and various and complex topics was possible only because being a signal processing specialist I had the role to take care about the signal and data treatment. It has been really a very hard and challenging period, during which I got a lot of troubles and I was somewhat drowned up by knowledge demand. But at the same time I was obliged and stimulated to learn a lot and to open my mind and in particular I learned the way to co-operate and to work in a group or even in different groups.

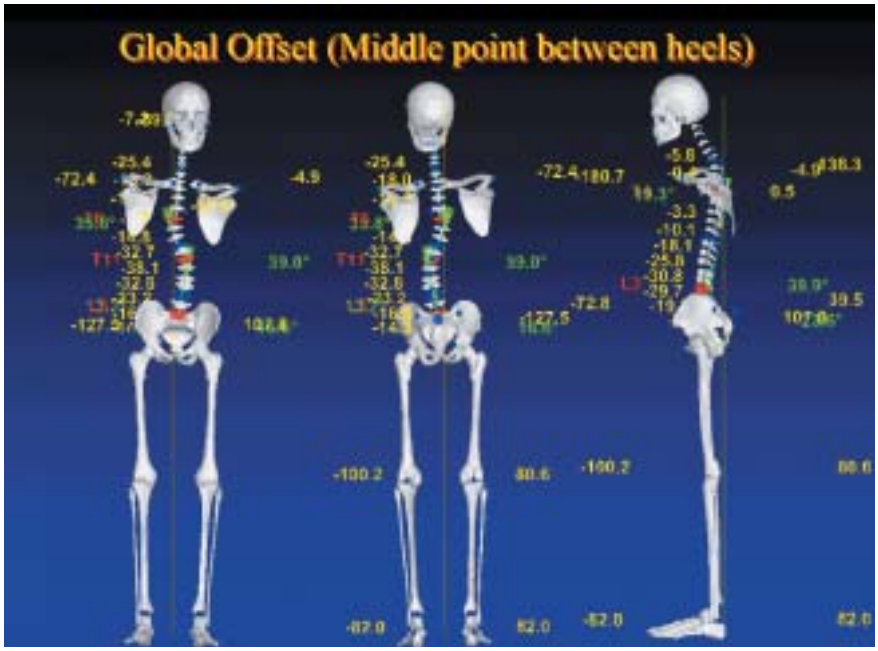


3D reconstruction of the skeleton for static analysis (ASAP Procedure by M. D'Amico)

ASN : In this context, why the spine and particularly scoliosis ?

At the Don Gnocchi-Pro Juventute Rehabilitation Foundation (one of the owner and promoter of CBI) there is a very big Department devoted to Scoliosis, Back Pain and spine related pathologies. So given the fact we were developing, at CBI, a new opto-electronic system to measure 3D spatial positions and movements of the body, it was quite natural to receive from our clinical colleagues various different solicitations to approach also the problem of spine shape measurement. We were asked to study the possibility to apply this non ionising method to spine analysis in order to have the likelihood to measure subject characteristics as many times as necessary especially in evolving deformities and also to study the relationship between spine morphology and subject's global posture. But the most demanding questions were to find a method to measure spine shape in its 3D characteristic and possibly both in static and in dynamic condition (to take into account spine functionality measurements). This has been the starting point of my work of the last 10 years.

I think it is useful to briefly remind how an opto-electronic measurement device works. From an intuitive point of view it is quite simple, in fact the basic developing approach has been to try to reproduce the same stereoscopic viewing process present in most animals and in humans. We, as humans, are in fact capable to view the environment and to perceive its threedimensional aspect because we are provided with two eyes. It is not so difficult for us to establish the position of an apple on a table and to go to catch it. This is because our brain receives an image of the environment from one eye and the same scene from the other eye but with a slight shift given the distance between the two eyes. Our brain processes this information and it makes us able to



Global offset - middle point between heels (ASAP Procedure by M. D'Amico)

perceive the height, the width but also the distance of the position of the apple with respect to that of our hand (our brain develops such ability with the experience during the first childhood producing what in maths is called triangulation). So the basic functioning of a 3D opto-electronic measurement device is to use at least two TV cameras (the eyes of the system) to view the desired environment and then to use this stereoscopic information to obtain the assessment of the 3D position in space of an object. In order to simplify and to speed up the needed mathematical process a family of opto-electronic device uses particular objects (in general little hemispheres coated by retro-reflective paper called markers) to mark up some body landmarks of interest and measures their spatial position both in static and in dynamic conditions. In this way it is possible to identify for instance the spine by putting an appropriate number of markers on palpable spinous processes and measuring their 3D positions in space. The general accuracy of the measuring process depends on the system used and on the TV Cameras field of view. The measurement error, to measure the human posture and spine shape, can vary from fraction of millimetre to few millimetres.

Not withstanding this high accuracy in the measurements it has been necessary to employ almost five years in order to move from approximate spine identification to reach a reliable approach and a measurement protocol able to produce repeatable results and clinical parameter extraction comparable to X-Ray analysis. In fact accuracy was only a necessary condition in order to proceed to a correct measurement but it was not sufficient to produce the sought results. We discovered that this topic is a very high demanding signal processing task especially if, given practical clinical reasons, the number of body landmarks has to be maintained as low as possible. We were successful in limiting the necessary number to 11 spine markers starting from the position of C7 spinous process down to S3 every second vertebra.

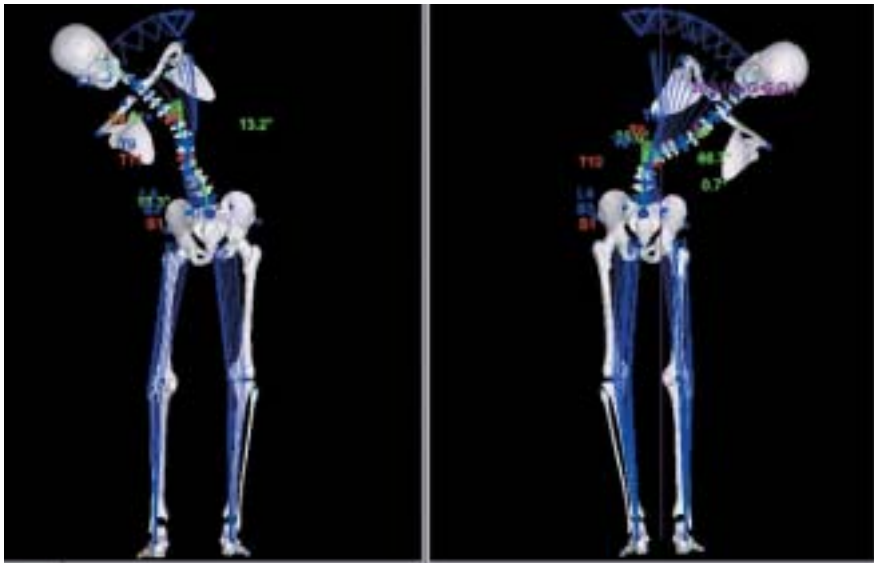
Other following five years have been necessary to develop a complete 3D self-fitting biomechanical model of the human skeleton. During this long period the parallel important task has been to study and set up a balanced clinical protocol. The challenge was to couple the necessity to obtain rigorous measurements to develop good mathematical-biomechanical model maintaining at the same time the compatibility with the general clinical necessities of time limits and manageable practical complexity of the evaluation process.

Finally the advantages obtained with this approach are really a lot because it is possible now to obtain different measurements both in static and in dynamic conditions and to ask the patient to perform many different postural tasks obtaining very accurate and useful measurements without any danger. Postural and functional behaviour as well as pathology and or therapy effects can be quantitatively and continuously monitored.

But of course the major limits of this approach is related to the impossibility to describe parameters like the vertebrae shape, their axial rotation the bone maturity degree and all the "inside" information.

ASN : You are an engineer but you work a lot in a clinical environment. How does the cohabitation between engineer and medical doctor goes and which is the role of the engineer in this environment ?

Oh really not so bad at all from an engineer point of view! I hope it is the same for my medical colleagues! Yes, in general, to work in a group formed by different competencies might generate some tension inside the group. This is particularly true when besides the competence arises also the matter of responsibility. In clinical environment it is clear for everybody that only Medical Staff has the right and also the responsibility to take decisions about clinical solutions for patients. But



3D reconstruction of the skeleton for dynamic analysis, i.e. lateral bending (ASAP Procedure by M. D'Amico)

sometimes, in particular fields as for instance that of Biomechanics, these decisions have to be taken by medical doctors by taking into account also some measurements processing and analysis given by Engineers and this could be really critical. There are tons of books about what is defined as the "Group dynamic" and for sure they are not related only to medical doctors and Engineers interactions.

The experience taught me that whatever is the group and/or the competencies expressed if the common task is approached only from a theoretical point of view, discussing about who could be charged to take decision and who is responsible for the decision to be taken, each component will try to

Dr Ing. Moreno d'Amico's short background

Moreno D'Amico was born in Pescara-Italy in 1961. He received his doctoral degree in Electronic Engineering and a specialisation in Bioengineering from the Polytechnic University of Milan. In 1986 he became a research fellow at the Centro di Bioingegneria (CBI) Fondazione Pro-Juventute Don Gnocchi - Politecnico di Milano where he contributed to the development of the well known and world spread opto-electronic 3D measurement device named "ELITE system". He developed at that period an automatic filtering and derivative assessment algorithm named LAMBDA (it was the topic of his Doctoral Thesis). At CBI he started to approach Basic and Applied Biomechanics concerning Rehabilitation and Sport fields. Given the large activity of this research centre, he was involved in many different projects both at a national and an international level. In the early 90s he was involved in Biomechanics of Sport and was elected in the ISBS (International Society of Biomechanics of Sport) board of directors for the period 1990-1992. In 1992 he contributed to the organisation of the 10th ISBS International Symposium in Milan.

At the same period in 1990 he was asked to found the Bioengineering and Biomedical Technologies Research Center at Papa Paolo VI Foundation in Pescara, his home town, where he was the Scientific Director. In 1994, he organized and chaired the 2nd International Symposium on 3D Scoliotic Deformities combined with the 8th International Symposium on Surface Topography and Spinal Deformity in Pescara. During this International Symposium the International Research Society of Spinal Deformities (IRSSD) was founded. In 1994 he became the Scientific Director of the research and diagnostic center Centro Valutazione Patologie Vertebrali (CEPAV)- Riabilitazione S.Stefano. The Riabilitazione S. Stefano is a very big private rehabilitation organization including three hospitals for high level rehabilitation and 15 ambulatory activity centers spread in various cities of the Regione Marche-Italy. The CEPAV is devoted to the evaluation of posture, spinal deformities and movement analysis by means of advanced technological opto-electronic instrumentation. The relevant part of Research activity is focused on Biomechanics both on clinical and therapheutical fields.

Recently, he founded a new Company (Bioengineering & Biomedicine Company Ltd.) for the production of new HW & SW systems for biomechanical analysis specially focused on spine. And finally this year he started to give courses on Biomechanics and technological approach to clinical analysis at the Faculty of Medicine of the University G. D'Annuzio of Chieti. Moreno D'Amico is the author and the co-author of more than 60 papers published in international journals and international congresses proceedings on Biomechanics, spine analysis and signal processing.

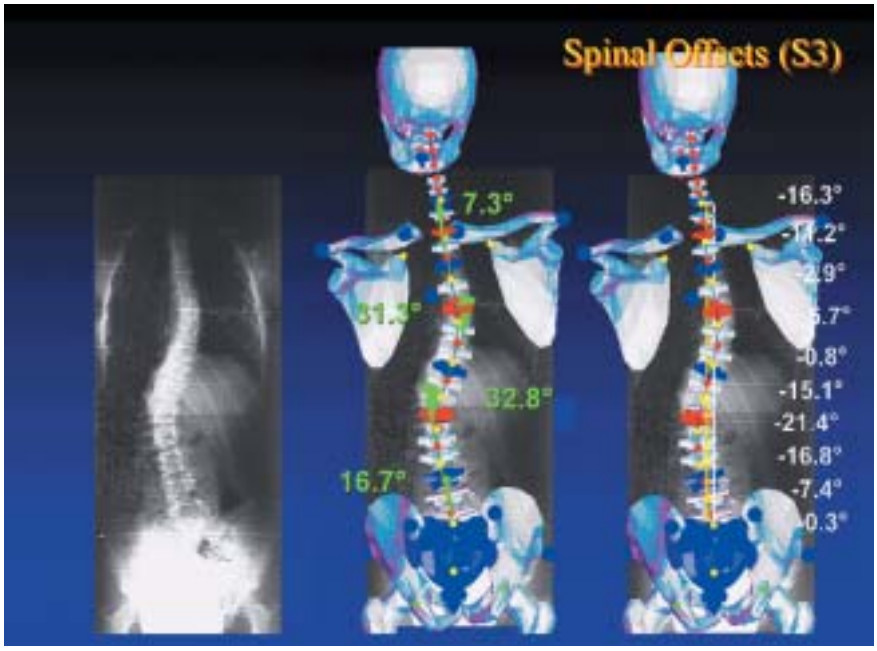
defend its own role, competencies and importance, building up very strong boundaries that could destroy the group sense. On the contrary when real problems have to be solved and in the group there is the real will to solve them, all the tensions immediately disappear or even do not arise at all. At the basis there must be this "Group Will". In this way all the members will be perfectly conscious about the importance and the necessity of their own contribution even when there could be a "little jump" over the theoretical boundaries of competence.

My work with my medical colleagues has been really good and stimulating. Of course there have been a lot of quite "hot" discussions but always devoted to the search of understanding.

Generally speaking the role of an engineer in medical field is well represented from a Lord Kelvin sentence: "When you can measure what you are speaking about and express it in numbers, you can say you know something about it". In this sense the engineer's role is to help to render as objective as possible any analysis using and developing the most accurate hardware and mathematical-statistical tools to this goal. Of course in this case the engineer has to be a Bio-engineer, i.e. to have the necessary basic knowledge on "biological systems" to correctly approach a clinical environment.

I feel very honoured to have heard from my Medical Doctor colleagues that the "Engineer approach" helped them to better focus the "Evidence Based Medicine", while on my Engineer side I got a lot of improvement in opening my view on the complexity of the "Human Body System" and on the approach of "Fuzzy Logic" when the possibility to strictly measure is limited.

ASN : Let us speak a little about the posture analysis techniques. You have quite an experience in this field. Do you think that this kind of analysis is always reliable and is it compulsory ?



Spinal offset (S3) and Cobb angles: the personalised model obtained by the opto-electronic procedure is superimposed on the X rays of the patient (ASAP Procedure by M. D'Amico)

Yes it is true, there are a lot of different techniques to analyse posture, but I should say there is also a lot of confusion about. This is due to different approaches and aims of the postural analysis performed and also due to different medicine branches involved in. Moreover sometimes there is the tendency to forget the technological limits of a given approach and to use it for not suitable tasks. Devices developed expressly for neurological analysis could be not appropriate for orthopaedic one and vice versa. Conversely it is not so infrequent to see the use of such devices in a field not completely appropriate both for clinical and research aims. Sometimes confusion starts with the definition of Posture itself. In this way I shall refer to Posture as a "continuously evolving dynamic event" that can be expressed as a position of the body maintained in space for some time under the continuous control of the Central Nervous System (CNS). This position could be characterized by an "equilibrium status" and its intrinsic variability in term of oscillations around this status. The intrinsic variability is strictly connected to a given physiological status (normal, voluntarily maintained, fatigued, under physical and/or psychological stress etc.). So changes in postural attitude and their variability are very important parameters in order to quantify the "good" functional action of body system as well as of CNS. So when analysing posture some shape measurement is of interest and there should be considered also the possible intrinsic variability connected to a particular postural status determining if the device used is able to correctly detect the whole phenomenon under study and if not to consider which could be the error level to be admitted for a given clinical evaluation. Thus, for instance, a rastereographic device is appropriate to measure back surface and rib hump but could not be able to determine sagittal spine shape changes for "continuous" postural analysis (short

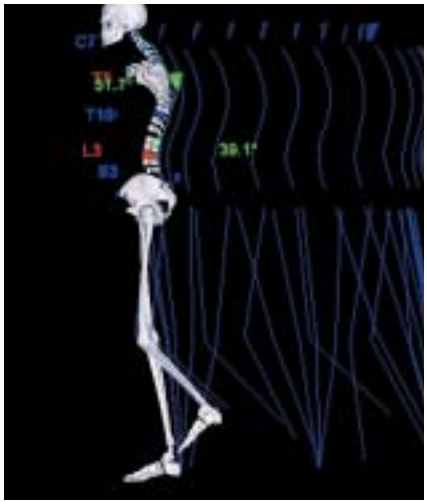
term oscillations) given its low acquisition rate.

ASN : How important is the work you provide for the orthopaedic surgeons in general ?

As I explained before with opto-electronic approach there are many evaluation opportunities to be advantageously used. As I underlined it is possible to obtain both static and dynamic measurements conditions and to ask the patient to perform many different postural tasks obtaining very accurate and useful-meaningful measurements without any danger. Postural and functional behaviour as well as pathology and or therapy effects can be quantitatively and continuously monitored. The orthopaedic surgeon can have an assessment of spinal stiffness at various levels focusing on hyper and hypo-mobility of different spinal segments before planning a surgical intervention for scoliosis reduction. Moreover postural and functional spine status in back-pain is really of great interest. In fact very similar lesions can be associated with completely different spine shape, posture, and behaviour as for the cases I presented in a past study, where patients had similar herniated disc located at the same level and with similar anatomical pattern of the hernia as measured by CAT and or MRI but presented very different spine morphology and posture with hyperlordosis or flat lordosis. This could really influence both conservative and surgical treatments.

ASN : We hear a lot about the scoliosis treatment, either orthopaedic or surgical treatment, but we know very few about the rehabilitation process related to this pathology. Could you explain to us what is the rehabilitation of scoliotic patients about and when can we say that the rehabilitation of a scoliotic patient is completed ?

Well a very challenging question! All of us would like to have the correct and definitive answer to this question. In general it is a common opinion that when idiopathic scoliosis has to be treated by surgery some failure should have occurred in the previous process: late investigation, underestimation of pathology progression and/or not sufficiently aggressive approach etc., but there are cases in which this unfortunately occurs even if all the precautions have been taken into account but spine attitude still remains unstable.
What we analyse and concentrate on is posture re-balancing. We use opto-electronic approach to measure different "static" postural tasks as indifferent orthostasis, self-corrected orthostatic posture, under-foot wedge rebalancing when leg length inequality is detected as in our experience happens in the majority of the cases (more than 95% of the analysed scoliotic population in our centre - some 800 patients).
In few words, the analysis we perform in the rehabilitation centre is based on an approach focused on conservative treatment and aims to at least maintain the spine in a stable condition (i.e. stop the evolution of the deformity), even in cases where the surgery will be necessary for further correction. We try to reach this goal by "re-balancing" the subject's posture (i.e. by inducing a reduction of postural global and spinal offsets as measured opto-electronically), so reducing asymmetric loads along the spine and the body and by "stabilising" this new posture by strengthening the posture muscles by appropriate individualised training. Sometimes we experienced clinical cases for which, when the pathology has been detected very precociously, it has been even possible to correct it simply by the use of ordinary foot wedges. We are deeply and intensively working on this topic in order to study and to get some insight on the basic pathomechanism that could generate scoliosis. We hope to find some answer about.



Movement analysis
(ASAP Procedure by M. D'Amico)

ASN : Thank you, Mr D'Amico for this quick but large overview you offered to our readers on a not so usual approach of spine study.

Interview by Anca Mitulescu ■

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Yves Cotrel foun for the research

"I dedicate this Foundation to all the patients I tried to treat in the past. May it serve the new patients for a better future. May it bring a real support to my young colleagues, orthopedic surgeons from all over the world"

Yves Cotrel

UNDER the aegis of the Institut de France, which continuously encourages the scientific research and creative initiatives, a new private foundation was created in January 1999. The Foundation aims to coordinate, sustain and promote - at both national and international levels - health research, more particularly in spinal diseases. The president of the administrative Board of the Foundation is Mr Pierre Messmer, former Prime Minister and Chancellor of the Institut de France.

Dr Yves Cotrel, the founder of this Foundation, decided to put his know-how and his long experience at the service of the new generation of researchers in order to help them bring to success their own initiatives in the particular research field of spinal pathologies.

His professional carrier was full of unexpected experiences - while he was preparing himself to become an obstetrician, he found himself detached to Berck, in the northern part of France, as an orthopedic surgeon. He spent there thirty years among young patients suffering from spinal deformities very difficult to correct at that time. Their suffering, their fear and hope made him orient all his efforts towards the understanding of phenomena related to spinal deformities and to their possible treatment as well.

Up to 1975, he continuously developed orthopedic and surgical techniques,

Photo Brigitte Eymann - © Institut de France

Pr. François GROS, Mr Pierre MESSMER, Dr. Yves COTREL & Pr. Yves LAPORTE at the official presentation of the Yves Cotrel Foundation

dation in spinal pathologies

which were very quickly evaluated as they were implemented on a great number of patients. With these techniques, national and international recognition were acquired.
In 1975, he was the Harrington Guest Lecturer to the Scoliosis Research Society (S.R.S.) congress in Ottawa, where he introduced his "New correction and fusion techniques for idiopathic scoliosis".

His enthusiasm was somehow challenged at the age of 50, when severe health problems obliged him to stop any professional activity.
But for this passionate and visionary man, this was only the beginning of another adventure. He launched himself in thorough researches of an optimal spinal instrumentation for scoliosis correction. Together with Dr Jean Dubousset he developed the first spinal implant that could allow a three dimensional correction of spinal deformities, while enabling an early post-surgical standing position for the patient, with no external retention with cast or brace.

In 1985, for the second time, he was the Harrington Guest Lecturer of the S.R.S congress, in Amsterdam, where he presented "40 years of treatment of idiopathic scoliosis".
He was the co-founder, head of the Clinical research department (1969-1977) and, since 1989, President of the Board of the "Institut de Recherche sur les Maladies du Squelette" (Skeleton Disease Research Institute), founder of the "Chaire Universitaire Marie-Lou et Yves Cotrel de Recherche en Chirurgie Orthopédique de l'Université" in Montreal, Canada (1995), author of several scientific books and publications, conferences and presentations all over the world, honorary member of several orthopedic and traumatology foreign Societies.
In 1989, together with Pr Jean Dubousset, Yves Cotrel received the World Award of orthopedic Surgery from Geneva University, and in 1999, the Gold Medal of the Institut de France for his contribution to medical research.

During the last 15 years, his researches and his new concepts on scoliosis correction opened the way to a rapid technological development that resulted in modern spinal instrumentations, well adapted to the three dimensional aspect of the deformed spine.

"But at the beginning of the third Millennium, there is still a lot of work to be done on this topic " says Dr Cotrel.

Apply for a grant :

The research programs which will be supported by the Foundation for 2001-2004 will be announced in October 2001.
The next deadline for receiving research programs (2002-2005) will be March 31st, 2002. Please make sure to indicate the following on your submission document :

1. Name of the team leader
2. Subject and description of the project
3. Duration of the study
4. Planned budget

All files must be sent to the Yves Cotrel Foundation Secretary Office. Detailed forms will be sent to the candidates whose projects will have been pre-selected by the Scientific Board of the Foundation.

For further information :

Please visit : http://www.fondationcotrel.org

Or contact the Yves Cotrel Foundation Secretary Office:
Ms Nora Muller-Conte
Institut de France - Secrétariat de la Fondation Cotrel
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Therefore he decided that he will now bring all his support - scientific and material, through this new Foundation, to fundamental and applied research in spinal pathologies.

Due to a lack of reliable prognosis criteria, the scoliosis follow-up and correction is still based on empiric observation and on symptomatic treatment. This empirical method of choice of a therapeutic strategy might bring prejudice to the final result, by longer or even abusive treatment in certain cases.

The orthopedic treatment of scoliosis applied to progressive cases consists in corrective braces prescribed to young patients during the growing period.

As for the surgical correction of scoliosis, usually needed in case of severe deformation of the spine, it consists in generating a fusion of deviated vertebrae in order to insure their stabilization, which yields a loss of mobility, one of the main functions of the spine. In other words, the surgeon has to choose "the best compromise".

"We cannot be satisfied with this situation" says Dr Cotrel. So, rather than distribute financial support in many directions, it seems more efficient to choose a specific theme to follow over 3 years periods and also bring together the most promising research programs following the same theme but coming from different disciplines, in order to create a multidisciplinary synergy on this topic.

Following the advice of its Scientific Committee, the Yves Cotrel Foundation decided to support a global research program for the period 2000 - 2001 focusing on the ethiopathology of idiopathic scoliosis in order to enable a better understanding of the origin and evolution mechanisms of this pathology.

During the three first years of the third millennium, the Yves Cotrel Foundation has decided to select and support the most promising international research programs in Biomechanics, Genetics, Endocrinology, Neurology and Metabolism, researching the origins of idiopathic scoliosis in order to have early detection, and, furthermore, to prevent its development.

* An Amercian project: *Genetic linkage analysis and fine mapping of familial idiopathic scoliosis*, proposed by Dr Nancy Miller, M.D., Assistant Professor - John Hopkins Hospital, School of Medicine, Baltimore, Maryland, USA.

* A French-Canadian project: *Biomecanical factors in idiopathic scoliosis*, proposed by Pr François Lavaste and Wafa Skalli - Laboratoire de Biomécanique - Ecole Nationale des Arts et Métiers, Paris, Toulouse, FRANCE, Montréal ,CANADA.

* A Japanese project : *Role of melatonine in idiopathic scoliosis*, proposed by Pr Masafumi Machida, Nihon University School of Medicine, Tokyo, Japan.

* An English project: *Changes in the endplate region in idiopathic scoliosis*, proposed by Dr Jeremy Fairbanks, M.D. and Jill Urban, M.D., Nuffield Orthopaedic Centre, Oxford - United Kingdom.

The work of these four teams during the three years of the research program will be presented twice a year to the scientific committee of the foundation.

On behalf of the Yves Cotrel Foundation, we would like to invite our readers to submit their proposals for spinal pathology related research projects as well as to bring their contribution to the development of the research in this field by any suitable means. ■

Anca Mitulescu

How can you support the foundation?

* *By making sure that people know of its existence.*

* *By making a donation Wherever the donations to the Foundation come from, there is only one policy : the funds are dedicated to research programs only. There is absolutely NO administrative fee withheld from them.*

First ARGOS Meeting in Belgium

Mons, Belgium - April 21st, 2001

Dr Henri COSTA, President of ARGOS Belgium, started the First ARGOS Meeting by introducing the purpose of this meeting - the standardization of the medical procedures, essential in the present international context. He reminded that the ARGOS main purpose is to create synergies between all spine specialists, such as orthopedic surgeons, biomedical engineers and researchers, spine professionals from the industrial field.

NOWADAYS, it becomes more and more important that different centers and groups could share information which directly requires comparable data. Standardization is thus a priority in the medical field and especially in orthopedic surgery where a huge amount of data is manipulated every day. The multicentric studies, more and more frequent, require identical protocols and procedures.
In this global context, the first step towards standardization goes thorough a consensus on the acquisition of data procedures. As the medical imaging is the main tool of analysis and diagnosis in orthopedic surgery, this meeting was entirely dedicated to radiography, which is still the main imaging technique in orthopedics, in spite of the evolvement of modern techniques such as CT scan and MRI. The speakers chose the lumbar instability as an example of pathology where the X rays are the most reliable medical imaging technique.

Dr PALAU and Dr LEGAYE

Dr Robert PALAU, from the Institut Mutualiste Montsouris (IMM) of Paris, France, presented the main advantages of the conventional X ray films in the diagnosis of spinal pathologies and especially in the lumbar instability. Ordinary static frontal and lateral incidences are preferred for most spinal X rays while dynamic lateral X rays prove to be extremely useful in lumbar instability analysis. As for spinal deformities, dynamic frontal X rays are preferred in order to detect the local stiffness of spinal segments. He also presented some X ray protocols particularly adapted to the dynamic analysis of the lumbar instability, emphasizing the importance of a good reproducibility of this protocol for the pre- and post-operative follow-up.
An ordinary Swedish chair can easily be employed in order to fix the sacrum of the patient in a stable position between the two X rays. The Swedish chair had already been used in a research study protocol by A. Templier, PhD, and it is now used on a routine basis in Pr Palau service for the follow-up of lumbar instability and proved its usefulness.

Dr A. TEMPLIER

Mr Alexandre TEMPLIER, Managing Director of Surgiview SAS, presented SpineView, a software dedicated to the diagnosis of lumbar pathologies, based on dynamic X rays (flexion/extension) analysis. SpineView provides the user with a large range of clinical parameters automatically calculated in real time after a first step of anatomical landmarks identification, previously performed by the operator. This software is the result of a collaboration study performed at the Biomechanics Laboratory of ENSAM, Paris (Laboratoire de Biomécanique de l'ENSAM, Paris; see ARGOS Spine News n° 2 and 3) with the ETS / LIO, Montréal (Ecole de Technologie de Montréal / Laboratoire de Recherche en Imagerie et Ortopédie du CHUM, Montréal; see ARGOS Spine News n° 1). An evaluation study has already

shown that SpineView not only reduces the data processing time from 1.5 hours (for the manual procedure) to 10 minutes (for the automatic procedure), but it also provides the user with very accurate data and insures a good reproducibility of the complete protocol.
Moreover, the Surgiview team is now developing a clinical database which will allow the user to automatically "call" the SpineView software data as well as all other data coming from different analysis tools. The evaluation of this clinical database is still in progress, but its usefulness has already been proven by several clinical testers. The role of this database is to allow surgeons to store all data concerning their patients but also to compare their results to those obtained in other clinical centers thanks to a central server on the internet. Thus, proceeding to multicentric studies could become very easy as data will be comparable.

Pr Jean LEGAYE, from the Department of orthopedic Surgery of the Univerity Hospital of Gent, Belgium, presented a study on a large set of parameters calculated from X rays for the assessment of the spine instability. Multiple correlations among several clinical parameters and indexes related to lumbar spine were found. This correlations will facilitate the analysis of the lumbar instability and especially the prognosis, diagnosis and follow-up of this pathology.
This study is the result of years of research and most of the parameters calculated are inspired by Pr Duval-Beaupere and her team's work.

Dr Bart POFFYN, from the Department of orthopedic Surgery of the University Hospital of Gent, then presented several clinical cases of instability. He stressed the importance of the choice of imaging techniques for each case in order to better apprehend the pathology and to better prepare the treatment strategy. While the acquisition protocol, the data storage and processing should be standardized, the choice of a therapy strategy will always be patient dependant and therefore cannot be standardized.
In conclusion, conventional radiography still remains a very useful imaging technique for certain orthopedic pathologies. As the speakers showed, for some pathologies, it might be the only reliable one, providing the surgeon with capital information. But one should not forget that X rays may be risky for the patient with regard to X ray doses if repeated to short intervals.
Another important conclusion of this meeting is that every patient is unique and the treatment cannot be generalized. Therefore the storage of the whole follow-up data is usually time consuming. The importance of new acquisition, analysis and storage tools for these data is obvious. Database and specialized software for the analysis, prognosis, diagnosis and strategy planning will soon become essential in any orthopedics department in order to better approach the standardization of these data.

Once again, this ARGOS meeting showed the importance of a real and permanent synergy between orthopedic surgeons, biomedical researchers and spine professionals from various industrial fields in a global approach and apprehension of different topics related to spinal pathologies. ■

Anca Mitulescu

Dr POFFYN and Dr VINCENT

In Situ Contouring Technique for the Correction of Scoliosis

Jean-Paul Steib
Hôpitaux Universitaires de Strasbourg, France

As we already showed in our article on the history of the posterior surgical techniques applied to scoliosis , the concept of osteosynthesis as stabilization of the deformed spine has been adopted long ago, at the beginning of last century and further developments of this concept led to the design and manufacturing of sophisticated spinal instrumentations, each one adapted to a specific surgical technique. We would like to present here a less known technique, one of the latest surgical techniques fully adapted to the correction of scoliosis - the In Situ Contouring Technique, adapted and developed by Professor J. P. Steib.

THE concept of in situ contouring technique was introduced by Jackson who used to perform it for lumbar fractures treatment and is now used for several spine pathologies.
The most important feature of this technique is that it combines several mechanical principles during the correction maneuvers that fully correspond to physiological normal combined movements of vertebral segments.
Besides, one major advantage of this technique is the possibility to perform corrective actions step-by-step, level-by-level and plane-by-plane. Another essential specificity of the in situ contouring technique is the separation of the surgery in two main steps: insertions of the rod and correction by iterative maneuvers.
This technique has been performed for the first time in 1993 and has been widely used ever since not only for scoliosis but also for spinal fractures, tumors, malunion with hyperkyphosis, spondylolysthesis and other spinal pathologies.
Since scoliosis is an “extreme” deformity of the spine and therefore its surgical correction is a long and fastidious procedure, we will present here the application of this surgical technique to scoliosis treatment.
The first main step of the in situ contouring technique is the insertion of the rod and implants before correction.
The instrumentation (insertion of rod and implants) is performed without traction of the patient and it has no corrective purpose. The insertion of the rod is realized implant by implant in a two steps operation from one end of the construct to the other end (figure 1).
The rod is modeled before being inserted into the implants. Once inserted, the closing of the screws and/or hooks can be achieved easily.

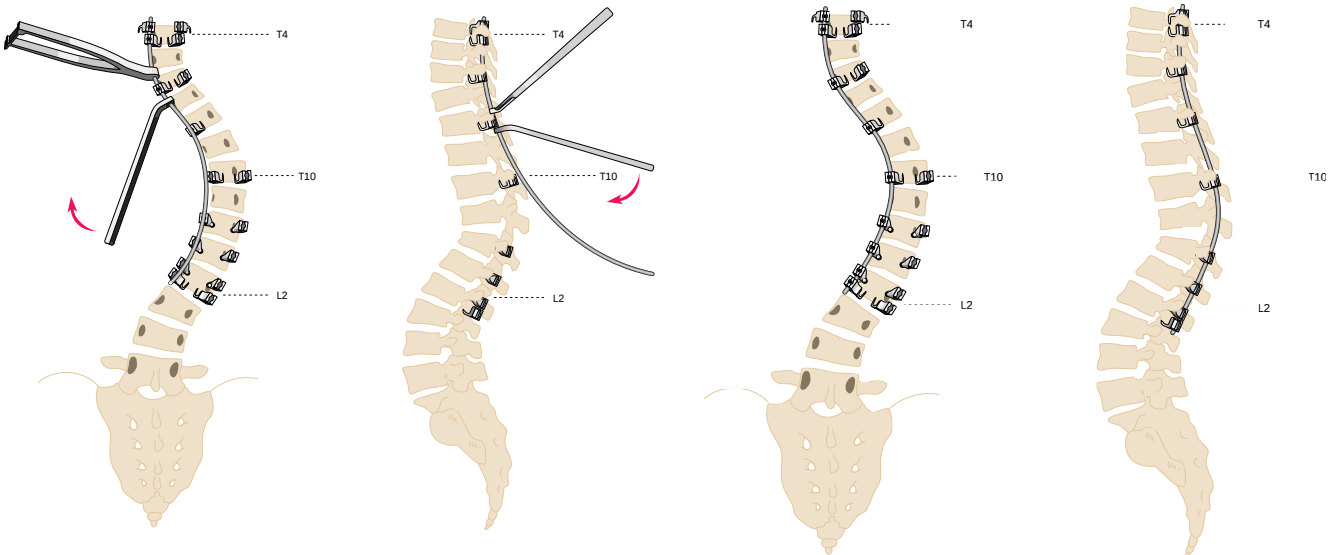


Figure 1 : Modeling of the rod and insertion into the implants

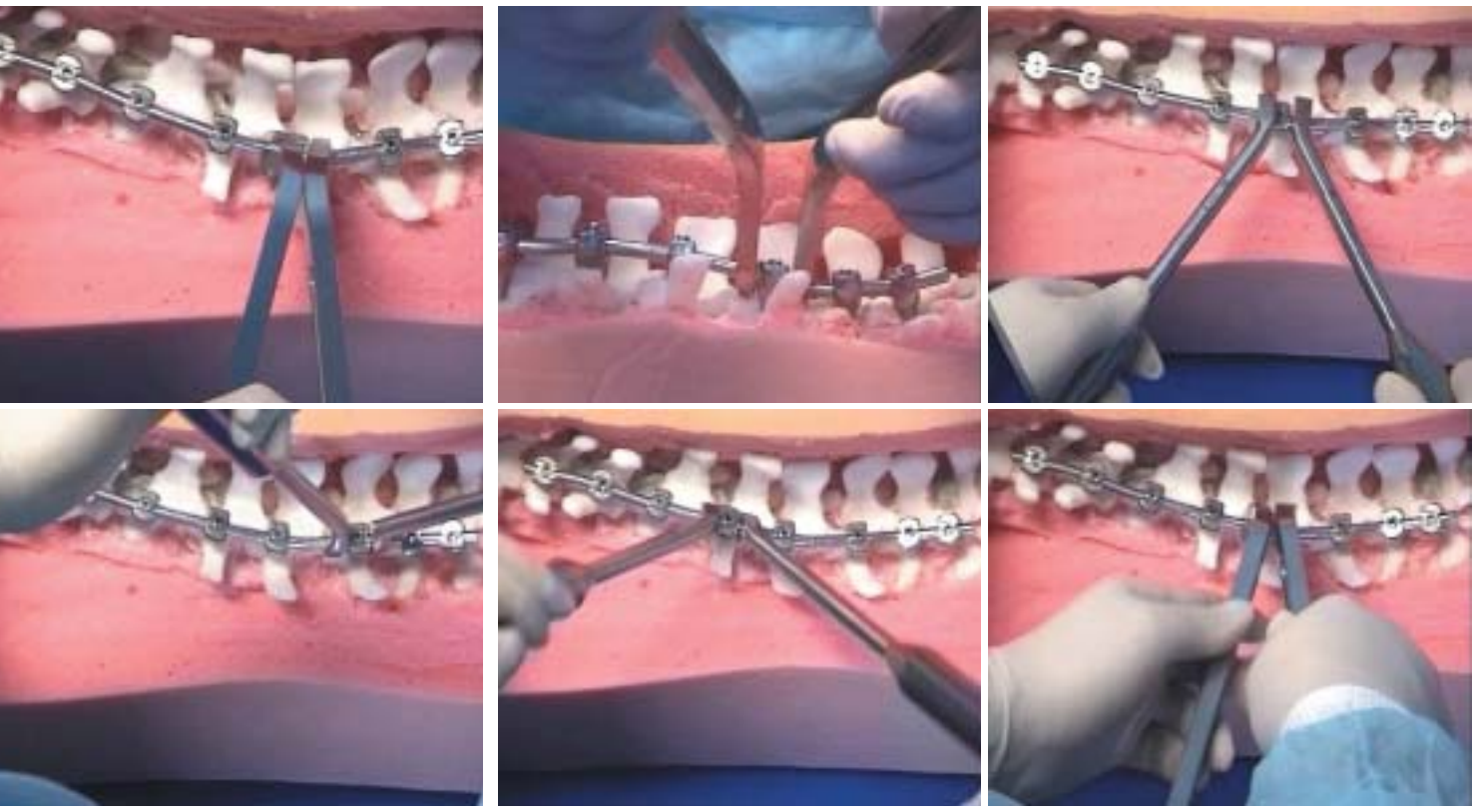
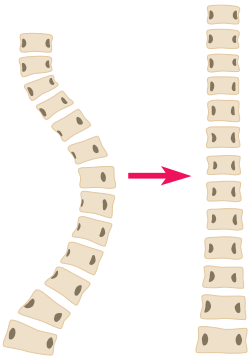


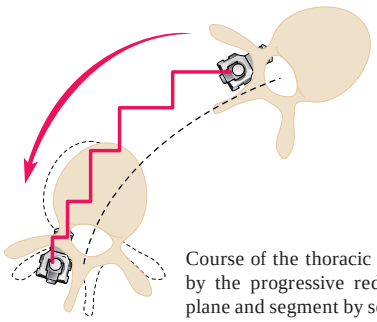
Figure 2: In situ contouring maneuvers of correction

The second step of the surgery consists in corrective maneuvers performed plane by plane and segment by segment by contouring the rod in two planes (sagittal and frontal), at different levels (figure 2).

In the specific case of the Spinal Clip System (SCS), the mechanical features of the rod allow the transformation from the plastic domain into the elastic one, in order to insure an optimal behavior during the main phases of the surgical procedure: pre-constraining of the rod, correction by successive contouring, stability of the final correction. This last requisite is insured by the second rod insertion, in the case of scoliosis. In the specific cases of fractures, tumors and degenerative pathologies treatment, the contouring is performed simultaneously on both rods, mostly in the sagittal plane.

As for the vertebral movement (figure 3), the in situ contouring technique presents a major particularity with regard to other techniques: it is a composed movement, which does not





Course of the thoracic vertebra allowed by the progressive reduction plane by plane and segment by segment along the curve of the scoliotic deformity. The vertebra is pulled back and medially

Figure 3: Movement of vertebrae during the contouring maneuvers

correspond to any pure movement (translation, rotation, distraction, compression). The vertebra is mobile in space and the corrective action follows a path that allows the surgeon to bring it in a physiological location by copying the path of the deformation.
With regard to other surgical techniques of correction of scoliosis, the number of implants used for the in situ contouring is higher than in other techniques in order to better share the loads along the instrumentation to avoid local excessive stress. An important consequence of this implant distribution along the spine is the possibility to instrument the apical zone, in the case of scoliosis, and therefore to better handle the local correction of this segment.
The successive manoeuvres allow an optimal distribution of corrective forces on the whole length of the rod, in the frontal plane as well as in the sagittal plane. Furthermore, the experience proved that the segmental step-by-step correction is more adapted and easier to put into practice than other techniques.
The three-dimensional correction, the correction in the apical zone, the possibility of obtaining derotation without distraction, the separation of the surgery into two main steps - instrumentation and correction are the main strong points of this technique.
Evaluation studies in progress show that the in situ technique is a continuously developing technique, safe and easy to put into practice for well-trained surgeons. Moreover, it seems perfectly adaptable to several pathologies, allowing both two-dimensional and three-dimensional mastering of the correction during the surgery. ■

We will present, in one of our next issues, a global feedback, including quantified results of statistical analysis, obtained from the evaluation studies of the In situ Contouring technique applied to scoliosis as well as to several other spinal pathologies.

Bibliography

1 Steib JP : Une autre façon de réduire les déformations rachidiennes : le cintrage in situ. EUROPEAN JOURNAL OF ORTHOPAEDIC SURGERY & TRAUMATOLOGY, 1994, 4 , n° 2, 70-72.

2 Steib JP : Y a-t-il une alternative à la rotation de la tige dans le traitement chirurgical des scolioses ? 25ème RECUEIL DU GROUPE D'ETUDE DE LA SCOLIOSE, 1994, 193-198.

3 Steib JP, Ducrocq X., Averous Ch., Bogorin I : Correction chirurgicale des scolioses lombaires : comparaison de différentes techniques : résultats. 27ème RECUEIL DU GROUPE D'ETUDE DE LA SCOLIOSE, 1996, 51-55.

4 Steib JP., Ducrocq X., Avérous Ch., Bogorin J: Surgical correction of lumbar scoliosis : a comparison of different techniques results. Eur. J. Orthop. Surg. Traumatol, 1999, 9, 3 : 151-156.

5 Steib JP : Traitement chirurgical du spondylolisthésis. In : DIETMANN JL, DOSCH JC, STEIB JP, IMAGERIE DU SPONDYLOLISTHESIS, COLLECTION D'IMAGERIE RADIOLOGIQUE. MASSON ed, Paris/Milan/Barcelone, 1995, 115-126.

6 Steib JP : Les "nouveaux" systèmes d'instrumentation rachidienne postérieure : l'instrumentation "SCS". CAHIERS D'ENSEIGNEMENT DE LA SOCIETE FRANCAISE D'ORTHOPEDIE ET TRAUMATOLOGIE : INSTRUMENTATION RACHIDIENNE, 1995, 53, 121-124.

7 Steib JP : Moyens de fixation sacrée et lombo-sacrée dans la chirurgie du rachis dégénératif. CAHIERS D'ENSEIGNEMENT DE LA SOCIETE FRANCAISE D'ORTHOPEDIE ET TRAUMATOLOGIE : INSTRUMENTATION RACHIDIENNE, 1995, 53, 229-235.

8 Steib JP: Spine-Contouring System in lumbosacral arthrodesis. In : MARGULES JY et al, LUMBOSACRAL AND SPINOPELVIC FIXATION. LIPPINCOTT-RAVEN PUBLISHERS ed, Philadelphia, 1996, 421-430.

9 Steib JP: Le cintrage in situ dans le traitement des scolioses. Un autre chemin pour la réduction chirurgicale des scolioses. In : DE SEZE S, DEBEYRE J, HELD JP, REVEL M, REEDUCATION. Expansion Scientifique ed, Paris 1997, 158-161.

Web review

Orthopedic surgery appears on the internet in a variety of contexts ranging from academic institutional websites and websites for commercial ventures to personal webpages for individual surgeons. Educational material and product information is now avalaible around the clock.

www.asb-biomech.org

The American Society of Biomechanics (ASB) was founded in October 1977. The purpose of the Society is to provide a forum for the exchange of information and ideas among researchers in biomechanics. The term biomechanics is used here to mean the study of the structure and function of biological systems using the methods of mechanics. There are several regional and national associations - the American College of Sports Medicine, the American Society of Mechanical Engineers, and the Orthopaedic Research Society, for example, which regularly or occasionally assign portions of their meetings to biomechanics. These however, are generally attended by those people associated with the parent field. As a result, there is little opportunity for the kind of exchange between people working in different fields of application that would clearly benefit all concerned. The American Society of Biomechanics was formed to meet this need. The Society is affiliated with the Journal of Biomechanics.

www.coa-aco.org/

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The COA, in partnership with the Arthritis Society, launches a cross-country public awareness initiative called "Canada In Motion" with the hopes to raise general awareness of orthopaedic and musculoskeletal issues in Canada. Dr. Rorabeck, in one of his final addresses as President of the Association, provides an overview of this important initiative and how it could benefit orthopaedic surgeons and patients nationwide.

www.sicot.org

The International Society of Orthopaedic Surgery and Traumatology SICOT is the world orthopaedic organisation. It is a truly global association of specialised surgeons and researchers devoted to the advancement of the orthopaedics and traumatology on an international level. SICOT aims to improve the quality of care world-wide and thus improve the quality and functional capacity of people's lives

www.orthogate.org/

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www.mrcas.ri.cmu.edu/

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www.cor.ssh.edu/

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www.efort.org

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