Paulo Sérgio Perri de Carvalho

Full professor at the State University of São Paulo (UNESP) and University of São Paulo (USP), Dr. Paulo Sérgio Perri de Carvalho has many qualities among which is his consistency in teaching classes with words strictly pronounced in a strong and invariable voice. Specialist, MSc, PhD and full professor of oral and maxillofacial surgery and traumatology, Professor Perri devotes 34 hours of his week to his academic career. For this reason, he is oftentimes found on Marechal Rondon road, where he goes from Araçatuba (his home town) to Bauru.

Dr. Perri devotes his spare time to employing his practical-scientific knowledge and treating patients at his private clinic where he can enjoy the company of his wife, Prof. MSc. Mariliza Comar Astolphi de Carvalho, specialist in Restorative Cosmetic Dentistry, Dental prosthesis and Periodontology. Throughout his brilliant career, he devoted himself to the study of bone tissue. Nowadays, he is seen as an authority on bone graft. Dr. Perri's great clinical experience in techniques for harvesting bone graft from the skull has enabled him to give theoretical classes that are well-provided with case and scientific reports previously investigated by him, which give a more realistic and precise tone to his explanations.

This interview gives us the opportunity to know about a dental surgeon who chose to make a difference by working as a professor, a researcher and a clinician, and in addition to that, by being a great person who goes from one dental specialty to another without further issues.

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Dr. Paulo Perri
CIR. BUCO-MAXILO-FACIAL

According to deliberation 13, issued on the 17th of May, 2011 by UNESP, the academic career at the State University of São Paulo "Júlio de Mesquita Filho" has vertical and horizontal levels of progression. The vertical levels begin with a career as an assistant professor, move forward as an assistant doctor professor, adjunct professor and, finally, full professor, the highest position one can occupy. Since you graduated from UNESP, in 1976, you have devoted yourself to studying oral and maxillofacial surgery and traumatology, going for a Masters course one year after graduation. Did you aim at following an academic career and becoming a full professor since you received your degree in Dentistry? What did you expect from a full professor at that time and how do you see yourself as a full professor nowadays? Is there any difference from what you expected? Has any former professor been an example to you?

When I was an undergraduate student, I was firstly interested in Pathology, a subject about which I conducted some studies under the supervision of Prof. Ronaldo Maia Melhado. However, as the clinical disciplines evolved, some of them stood out, as it is the case of Endodontics, led by Prof. Roberto Holland, and Surgery, led by Profs. Ruy do Santos Pinto, Tetuo Okamoto and my brother Prof. Antonio Cesar Perri de Carvalho. These disciplines stood out because the clinical procedures they taught were based on research and explanation, not on techniques that should be practiced. From that moment on, I became interested in the academic career, however, my aim was not to become a full professor, but a professor who taught a leading discipline and was involved in research as well as in evidence-based clinical application. In spite of that, I was aware that academic titles would come if I devoted myself to studying, researching and practicing the dental sciences.

The professors that taught when I was an undergraduate student used to have a "romantic" idealism, with fewer duties and less demand; differently from what happens nowadays, when professors also have to deal with many administrative issues. From a hierarchy point of view, in old times, talking to or questioning a full professor was a privilege of a few, which nowadays is indispensable, given that more experienced professors can do a better work when dealing with the wide variety of university students.

With regard to my expectations, they have been completely fulfilled. This may have been due to the fact that my older brother was a university professor in Araçatuba and, for this reason, I had the opportunity to closely experience what it was like to be a university professor, with the difference that I have always been more restless with regard to the limits that the academic career has imposed, including the activities performed outside the university.

As I have mentioned before, I had the opportunity to follow the example of many professors who taught the disciplines with which I worked until February, 2013. I tried to follow their example while building my own academic personality, but working with my adviser Prof. Tetuo Okamoto as well as with my brother, Prof. Cesar, were certainly more determining. Additionally, working with Dr. Ruy dos Santos Pinto, founder of both the Surgery postgraduate program at the School of Dentistry — State University of São Paulo/Araçatuba and the CAOE (Center for Exceptional Patient Care); Prof. Edmur Callestine, Prof. Márcio Giampietro Sanches, my partner in class and surgery procedures; Prof. Michel Saad Neto and, recently, Prof. Osvaldo Magro Filho and Prof. Idelmo Rangel Garcia Junior, was of paramount importance. Not only could I learn with each one of these professors, but I also had the opportunity of sharing academic experiences with them.

The position of full professor can only be occupied by someone with experience in teaching and research. As a full professor who has been working in two of the most important Brazilian universities, what are the differences in responsibility between a full professor and an assistant PhD professor?

Full professors aim at leading a team, fulfilling this function as positively as possible by encouraging and discussing with their group about the wishes and opportunities of each member. They have to provide, create or demonstrate equal opportunities for all members of the team while recognizing that these opportunities will be taken differently according to the potential, academic and emotional moment of each member.

According to each university code, a full professor has administrative duties that can only be performed by other professors, for instance, those who occupy a management position, in case of formal renunciation. Some universities, however, accept that these duties be performed by a doctor professor.

Thus, the difference between a full professor and the other professors is that the former position is usually occupied by more experienced professionals who should use their position to establish a balance as well as to positively lead their team without limiting or hindering one's progress.

As an educator, you play an essential role in motivating and encouraging students to seek knowledge. What do you consider to be the most essential point of any university training students to be restless and critical towards the decisions they have to make?

The most essential point is undoubtedly encouraging the search for knowledge, which science has proved to be unlimited. When Socrates, the philosopher, was considered the most wise man in Greece, he professed: "The only true wisdom is in knowing you know nothing." In other words, he makes evident that the more we know, the more we must be aware that we always need to learn. Researchers need to be humble about science. On the other hand, Pope Francis, during his recent visit to Rio de Janeiro, said that the young need to be revolutionary. He did not mean revolutionary in the sense of being violent or aggressive, but in not being a conformist. Thus, training professionals to be restless means letting them think that they do not own the truth, that there is a long way ahead of them to be followed in the search for knowledge. Additionally, it means letting them think that they cannot be conformists and believe that everything will naturally happen in their academic life, but that they have to find the answer for their questions and that is what comprises the different areas of knowledge. As for criticism, it is achieved by continuous and reflective study, although it may vary according to how mature students are. The educator must interpret these individual nuances and promote a series of educational as well as motivating actions in order to develop students' criticism.

Your intense scientific production is one of the most remarkable characteristics of your career, demonstrating deep devotion to teaching and to the university itself. However, you never stopped treating your patients, you have always continued with your clinical activities at both the university and your private clinic. Could you, please, give us some examples of scientific evidence applied to surgical procedures and which are frequently used in your surgical practice?

My first contact with Implantodontics was in 1989, during the training course for the TF system, in Rosario, Argentina. During the course, we had the chance to watch a series of surgeries performed for implant

placement, and the first doubt I had was about the drilling procedure, given that we had published an experimental study demonstrating that the rotary instrument injured the bone surface and the repair of bone cavity was impaired according to the type of trauma received. When I returned to Brazil, I searched for studies that investigated the theme, but little data was found about the subject. That was my first research on Implantodontics, in which we assessed the action of milling cutters on rabbits' fibula with and without irrigation. Subsequently, we conducted a research on implant placement after drilling with and without irrigation. The results demonstrated that implants installed with drilling without irrigation did not osseointegrate. For each doubt I had, I developed an experimental trial with the material we had available in Brazil. The outcomes of such researches gave me confidence and knowledge of how to employ Implantodontics in my clinical practice. The same happened with bone graft and biomaterial. And that is my routine. I clinically employ the techniques and material that have been scientifically proved by my researches or by studies conducted by other researchers.

There is a wide gap between scientific publications and the dental surgeon exclusively dedicated to the clinical practice. In other words, the number of professionals who seek knowledge in the source, in tested and strictly published researches, is limited. In your opinion, which changes can be made to the current publishing system in order to allow the scientific findings to enter into ordinary dental practice?

There are many means by which one is able to seek knowledge: paper-based or online national journals, renowned international paper-based or online journals, national text books with excellent content, translations of international books, scientific events comprising different specialties, interviews, and others. To my view, there is never enough reading and studying! Most professionals in the Dentistry field appreciate a technique and limit themselves to using it without worrying about understanding its causes, longevity and potential complications. And why does this happen? Because most procedures are reversible. But, to my view, this is characteristic of our profession.

The distance between scientific evidence and the dental clinic is a bilateral deficiency. Scientific evidence is not employed by clinicians at the same time that, with a few exceptions, the results yielded by treatments performed in private clinics are not published. How do you perceive such situation? Is it possible that, in the near future, clinicians will be involved with scientific investigation?

Scientific studies developed in private clinics are nationally and internationally published. However, these studies are normally conducted by professionals who have been involved with postgraduate programs or research groups, they are not exactly a scientific investigation, but clinical results obtained from a registered procedure with previous scientific evidence. In the professional Masters I coordinate at São Leopoldo Mandic College, in the city of Campinas, I advise students to carry out retrospective studies based on the experience they acquire working in clinics and hospitals, and develop such studies into a thesis. With a treatment protocol in hand, it is possible to make comparisons, and after analyzing variables and samples, it is possible to develop a scientific publication.

Soon after you received your college degree, you entered a Masters and a Doctorate program. Your knowledge about alveolar repair is of paramount importance nowadays. In Cosmetic Dentistry, every millimeter plays

a decisive role in determining treatment success and failure. Which alveolar alterations, in esthetic terms, can be expected by the clinician months after extraction?

A few decades before osseointegrated implants, it was believed that implant placement with biomaterial delayed alveolar repair, in which case the best solution would be to fill the socket with coagulum. Such belief is still true, however, it has been proved that the alveolar process undergoes bone remodeling, more common with thin buccal walls in the anterior maxilla. This results in loss of the contour of the ridge and potential atrophic alveolar processes that hinder implant placement and esthetics. One of the treatment options for these cases is to fill the socket with biomaterial or place the implant immediately after extraction, filling the gap with biomaterial so as to minimize alveolar process remodeling. The duration of repair in cases of alveolar filling may range from 4 to 8 postoperative months. Although that option is available, there are cases in which connective tissue graft or the use of material incorporated to soft tissues is necessary to improve esthetics. Nevertheless, biomaterial is not recommended for all cases of alveolar defect. Autogenous bone graft is often used to reconstruct this type of bone defect.

Some techniques have been exclusively developed to maintain gingival tissue stability and improve the gingival phenotype in order to establish predictability and maintenance of the regular concave arch. Other procedures recommend immediate implant placement with immediate loading or immediate implant placement associated with autogenous bone graft harvested from the tuberosity. Connective tissue graft and the use of biomaterial as xenograft are also reported in the literature. Extraction of maxillary anterior teeth is a difficult decision to make. What should we do? How should a dental surgeon decide which technique is the best? What are the main aspects to be observed during diagnosis before surgery?

As I have previously mentioned, it is important to understand that biomaterial have some biological limitations. Thus, the professional must be wise when dealing with these cases. One should diagnose the type of bone defect as well as its cause, the periodontal biotype, the biological properties of the biomaterial to be used and the technical knowledge needed to solve the problem. Additionally, it is necessary to know the patients and how eager they are to cooperate.

Preserving the alveolar process is important for treatment success and depends not only on the technique of preservation, but also on the technique employed to extract a tooth. In many cases, the time spent to extract a tooth is longer than the time necessary for immediate implant placement. What do you understand by atraumatic extraction? What are the most important surgical instruments you use for atraumatic extraction? In your opinion, is flap surgery sometimes necessary in the anterior region? In which situations?

There is no atraumatic surgery. All types of surgery, whether complex or not, are somehow traumatic to patients. To define the best extraction technique, it is important to analyze the radiographic and imaging exams, identifying the root shape as well as its fragility and relation with adjacent teeth and anatomical structures. In order to perform extractions that are as atraumatic as possible, it is important to master the use of instruments such as forceps and periotomes. As for incisions made in the anterior region of the maxilla, they are recommended whenever the surgical instrument used for extraction cannot reach the site, in which case osteotomy is necessary. However, they should be

economically performed to avoid impairment of the surgical procedure.

Saucerization has been observed since the early stages of implant placement, when experiments were performed with dogs by professor Brånemark. Pericervical bone remodeling present in all implant and prosthetic connection models is a relevant factor to be considered in the medium and long-term maintenance of peri-implant tissues. Different prosthetic connection models, such as Cone Morse and platform switching, were developed to enable remodeling without bone loss. Which factors determine bone remodeling in this region? What are the advantages and disadvantages of Cone Morse and platform switching connections?

Peri-implant bone loss is multifactorial, given that it may happen due to implant placement in bone tissue with limited thickness, poor revascularization resulting in tissue resorption as well as microbiological and biomechanical causes. Some studies reveal that the periodontal biotype may also be involved. In addition to these factors, local factors such as poor hygiene, tobacco smoking and some systemic diseases may aggravate the clinical presentation. It is difficult to establish a cause for peri-implant bone loss. The professional must be wise and use all diagnostic and information tools available to establish patient's profile and determine the most appropriate surgical-prosthetic planning that meets patient's expectations.

Some microbiological *in vitro* researches reveal that the advantages and disadvantages of Morse and platform switching connections include the barrier created by Cone Morse implants, which apparently hinders bacterial colonization in the prosthesis-implant interface. Conversely, the platform switching connection apparently removes this gap from the peri-implant site, preventing the bone tissue from being affected by the presence of bacteria.

Additional *in vitro* studies are being conducted with the photoelastic experimental model and finite element methods. They reveal that the forces occurring in the implants, whether Cone Morse or platform switching, are projected in a centralized manner, preventing stress from accumulating in the peri-implant site.

Thus, researches have revealed the biomechanical and microbiological advantages of Cone Morse and platform switching connections. However, clinical practice is absolute and, for this reason, it must prove such advantages by means of clinical prospective and retrospective studies.

Patients who lost their maxillary posterior teeth often seek dental surgeons in order to have implant placement procedures carried out. As a result of a physiological process known as bone atrophy, the maxillary sinus cavity increases and, consequently, hinders implant placement before bone graft. Which are the available procedures employed to lift the Schneiderian membrane? In comparing auto and xenograft, what are the advantages and disadvantages of each procedure for the maxillary sinus?

Sinus graft prior to implant placement is frequently performed by specialists in Implantodontics or Oral and Maxillofacial surgery. This type of surgery requires that the remaining bone and the dimension of the maxillary sinus be analyzed in the latero-lateral direction. In a book we published in 2011 (*Fundamentos da Implantodontia, Editora Quintessência*), we recommend autograft or autograft associated with inorganic biomaterial for

5-mm remaining bone; biomaterial for 5 to 7-mm remaining bone and the Summer's technique for implant placement in case of 7 to 10-mm remaining bone. The last two recommendations require implant initial stability. Some studies have recently revealed that implants placed by means of the immediate technique, with stability, do not require the use of any filling material. As for the dimension of the maxillary sinus, its analysis is based on a research published in 2010, in which a maxillary sinus greater than 12 mm in the latero-lateral direction needs autograft associated or not with osteoconductive biomaterial.

In terms of the clinical results yielded by auto and xenograft, should the surgical procedure be performed without any accidents (for instance, laceration of the sinus membrane), in addition to a previous evaluation of patient's history (recent or current sinus pathology), the results are promising, with retrospective studies demonstrating success rates that range from 90 to 98%.

In the anterior region of the maxilla, bone atrophy is present in height and width. For this reason and due to the fact that it is not a cavity, its reconstruction differs from the maxillary sinus. The use of particulate bone for this type of reconstruction presents considerable difficulty in stabilization, in which cases the use of block graft, screwed to the receptor site, is more common. Block autograft may be harvested from different intra and extraoral regions. If we consider surgical morbidity, tissue availability, graft quality and long-term volume maintenance, which is the best graft option?

The best autograft is the corticomedullary one. Intraorally, oblique line graft is predominantly cortical, while the menton is corticomedullary. The difference lays in the postoperative phase in which the menton may present some undesirable complications. Both types of graft keep the volume in the late postoperative phase, however, the menton site presents greater bone availability.

Intraoral donor sites are limited with regard to tissue availability. Should a large amount of graft be necessary for bone reconstruction, autogenous tissue can be harvested from extraoral sites. Could you describe the most common techniques, as well as their advantages and disadvantages, employed by Brazilian dental surgeons?

The most common extraoral donor sites are the anterior iliac crest and the skull. The skull is advantageous for keeping the volume obtained in the postoperative phase for a long period of time, while the iliac crest loses in volume due to the dimensions of the trabecular space. Another advantage of the skull is its bone quality. Areas reconstructed with skull bone graft present type II bone, whereas those reconstructed with iliac crest graft present type III or IV bone. Nevertheless, the iliac crest provides blocks that enable an increase in height and width with a single block, which is not possible with skull grafts.

Your researches reveal a preference for skull graft. The majority of the population, especially those with bone atrophy, comprises individuals who suffered a dental trauma when they were young. Implantology plays an important role in improving the image of one of the most feared professions. How do you deal with patients who feel insecure of treatment and to which you offer a technique of tissue harvested from the scalp?

I never try to convince patients of the advantages of skull graft. Initially, I try to explain that a reconstructive surgery will be necessary to meet treatment expectations. Additionally, considering the patient's level of

atrophy, I also mention that a skull or iliac crest procedure will have to be performed in hospital. In any case, patients are impacted. However, when we mention the postoperative phase for each one of these approaches, the procedure performed in the skull seems to be more interesting. Many colleagues ask this question during courses or conferences. I have the impression that patients' acceptance is established by the professional's ability of explaining the need for graft and the advantages of a certain technique. A Master's thesis advised by me at São Leopoldo Mandic College, in the city of Campinas, reveals that all research subjects undergoing this type of procedure would recommend or be resubjected to the procedure of harvesting bone from the skull, if necessary.

One of the disadvantages of autograft, whether intra or extraoral, is the need for a second surgical site. A common alternative, especially when a great amount of graft is needed, is the use of heterologous bone from musculoskeletal tissue banks. What is your opinion about the use of bone from tissue banks?

I have no clinical experience with the use of bone blocks from tissue banks. I have followed both national and international publications, but what called my attention is that in 2010, JOMI (2010; 25: 525-531) published a systematic review on the subject and concluded that there is not enough evidence to establish the effectiveness of treatment comprising graft integration, ridge augmentation and implant survival. In 2008, Garbin Junior (PhD in Oral and Maxillofacial Surgery, State University of São Paulo — UNESP/Araçatuba) conducted a research in which he compared autogenous and homogenous grafts. He concluded that in late groups the autogenous bone had been replaced, while the homogenous graft had been integrated, was acellular and without remodeling.

Some companies known for commercializing xenograft particulate bone have recently made block xenograft bone available. Do you consider it to be a feasible alternative for major reconstructions which have only been possible with the use of autograft bone?

Similarly to my previous response, I claim to have no clinical experience on this subject matter. We have recently conducted the surgical phase of a research focusing on this type of material and we will have an answer for that soon. However, many colleagues have proved some clinical cases to be successful, even though the findings have not been published yet. Faverani (PhD in Oral and Maxillofacial Surgery, State University of São Paulo — UNESP/Araçatuba) conducted a research with mineral bovine bone block and concluded that graft performed with DBBM did not promote osseointegration.

In the last ten years, the surgical techniques for implant placement have developed into procedures that do not require bone graft. The most common examples are zygomatic implants and the All-on-4 technique. Do you believe that all cases of edentulous maxilla may not require bone tissue augmentation by means of bone graft?

The criteria for employing the All-on-4 technique are restricted to cases of pneumatized maxillary sinus. However, it may also be used in a more posterior position and when the patient relucts to accept sinus graft. Cases in which I employed such technique yielded satisfactory results.

As for rehabilitation of patients with atrophic maxilla and zygomatic implants, I recommend the All-on-4 technique to cases in which implant placement and autograft have been unsuccessful. I have followed the cases published by two colleagues who I deeply respect and who frequently use the aforementioned technique, Dr. Hugo Nary and

Dr. Paulo Saad. Their findings reveal an interesting success rate, provided that the technique is performed by experts based on careful planning and who are fully aware of the technique as well as of its difficulties.

Therefore, I am not radical to affirm that the need for autograft, used to solve the problem of atrophic maxilla, no longer exists.

Many changes have occurred in the Dentistry field over the years of your career. Considered by the majority of the population as a traumatic profession, it has moved forward to a new position. Implantology has been in Brazil for more than 25 years and has changed the lives of thousands of patients whose confidence and self-esteem have been recovered. More recently, Cosmetic Dentistry has been concerned about treatment refinement and beauty. As a consequence, the dental surgeon has been given the role he deserves, acting as a professional of beauty and well-being. Which was the most motivating factor of your effort to have a solid career?

My career began in oral and maxillofacial surgery and traumatology (a course I still teach for undergraduate students at the School of Dentistry — University of São Paulo/Bauru), and from 1989 on, I began my studies on Implantodontics. Raised in a school that aimed at answering the "whys" by means of experimental research, I began with Profs. Márcio Giampietro Sanches, Álvaro Bosco, Renato Rossi and my wife, Dr. Mariliza Comar Astolphi de Carvalho, a series of experimental researches on osseointegration of national implants, for instance, the *Sistemas Conexão* and Emfils ones. Thereafter, in 2000, Ariel Lenharo, Antonio Vicente Souza Pinto and Laércio Vasconcelos, all doctorate students, and I researched the immediate loading technique in both animals and humans. These researches, associated with experimental studies on biomaterial and the clinical practice began to be published in scientific events and, consequently, my career was built. Thus, my initial motivation fell on the need to study the new specialty that was being established in Brazil. The sequence of facts that would come was not only a result of a lot of team work, in which every member is of great value, but also of the interest in raising a responsible professional awareness by means of scientific knowledge and continuous studies on this specialty: Implantodontics which, when based on careful planning, can improve patients' self-esteem, masticatory function and, above all, make them smile.

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