Implantation 101

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Summary:

Implants are consider to be the best conservative restoration available worldwide due to their success rate and biocompatibility but Implantation is challenging process for the clinician to make, doctors must took in consideration a huge amount of information such as patient history, life style, financial state and pervious or ongoing disorders or diseases in patient life to create a perfect plan for this process. Indications and contraindications should be monitored carefully. They have to minimalize the human errors or complication that comes with the steps of this process.

Keyword: implant, implantation, surgery, prosthetics, dentition, geriatric, tooth loss, Edentulism, osseointegration, dental bar.

Introduction:

Our goal in dentistry is to give our patients comfort and best treatment available for them. Due to that we have to create a perfect plan to diagnose and treat .in prosthetic we believe in best esthetics and function at the same time but sometimes its nearly unachievable to maintain both but still with a perfect designing and plan it's possible.
In this article we are trying to discuss:
How implants can affect a person life.
Methods and planning (kits.)
Indication & contraindication (complication & failures).

How implant can effect a life person:

There are many reason for a patient to be in need of implant but the most important one is missing tooth, it's as simple as that. Due to Edentulism (fully or partially) patient will have problems functioning and also esthetical problems .Edentulism can be due to aging , its different for every individual on which age it happens it can be full or partially .Studies showed that missing tooth can have a very important psychological impact on a patient specially in esthetic factors , most of the individuals care more about the looks than function .so our goal is to give them comfort, esthetics for the best look possible and speech ,as matter a fact missing tooth can have big impact on patient speech and that's critical .[1]

In geriatric stage most of the individuals have partially or full endontulism , and in that stage of life our body doesn't function like the old time that it used too , our healing process will be effected ,bone regeneration disturbance or even bone loss , maybe some systemic diseases or such can make our work really hard .in latest studies it showed that life expectancy of people are changing and it increased in time with better condition of life and technology .for example from 1000 BC to AD 1800 life expectancy at that time was around 22 years old , since 1960 life expectancy increased significantly and with each year passes it grow more in number , by the time 1995 its estimated to 60 years and till now it increases more and more . With increase in aging the need of implantation and fixed dental prosthesis increased significantly and more people will be effected by it in passing time. Only aging cannot be the only factors.[2]
One of the more reason that an individual will ask for implantation can be the social factors and society. missing teeth not only can damage the person from functional part, it can be destructive psychologically. Due to that the person can become depressed or isolate themselves from the society and social pleasures. Our goal is that too eliminate these problems and comfort our patients, and give them beautiful smile. [3]

Some main reasons of increasing the need of implant related material and treatment:

1. Aging the population.
2. Tooth loss related to the age .
3. Consequence of fixed prosthesis failure.
4. Psychological aspect of tooth loss.
5. Poor performance of the RDP (removable dental prosthesis).
6. Advantages of implantation.
7. Public awareness.

Implantation (methods and planning)

Implants have proven to us that they have better success rate than other restoration in our oral cavity. They are superior to other available treatment not only because of the success rate but the prevalence and biocompatibility but as that being said, still can be complications and errors like any other systems, we will talk about them through this article.
In implantation there are many factors at play to decide which methods and how the implanting process take place (this is not about contraindication or complications, they will get discus furthermore in the article), some of these factors can be the location of the missing dentition or the numbers of the missing tooth (single or multiple). Due to these factors we can

choose our methods or its better to say our kits, there are many kits available for these procedure.
Single implantation is less challenging compare to multiple for partial enduntolism or fully. In case of full or partial enduntolism, doctors face a devastating process to make sure the implantation fit the structure, enough foundation for the implantation to be applied (enough bone structure), location of the missing teeth and also the numbers of missing teeth. So due to all this clinicians should make the right decisions. There are many available kits & methods for these procedures, in this article we are going to point some out.[4][5]

Bar: before talking about other kits & methods, giving a feedback about dental bars or implant bars is crucial. these bar are designed to get mounted on the jaw (jaw bone) under fixed or removable dentures .patient due to bone loss there is not enough structures to fix prosthesis on them so implant bars can help through this process (not only for fixation , can help in bone rehabilitation) . CARA-I BAR can be a good example of dental bars , Implant superstructures manufactured from titanium or CoCr (cobalt – chrome) impress with their high accuracy of fit. These bars are individual for each case, so it's fabricated in many varies design with CAD/CAM (computer aid design / computer aid manufacture) and can be screwed with many different implant systems.[6]

MK1: this kit is mostly used for a full arch rehabilitation, due to the bone loss of the patient. , rehabilitation using the system MK1 fittings is well indicated. Such fittings provide the convenience of a fixed prosthesis without full palatal coverage. They are easy to remove for the patient and facilitate proper cleaning, especially in patients susceptible to pre-implant disease development. Manfred Kipp (1986-1988) was responsible for the development and manufacture of MK1 attachments.TheMK1 system consists of a molten metal infrastructure for a metallic bar that fits on the implants and contains two mounting holes at the ends. The superstructure placed in the inner portion of the denture has 2 pins that block the prosthesis when they are introduced into the bar holes. The assembly can be unlocked by inserting a small key in a hole which is easily accessible to the patient and is strategically located on the labial surface of the prosthesis in a region that has no influence on the esthetics. Due to its design removal of the prosthesis and the bar it can be easier and less harm full for the patient.[7]

All on four: The All-on-4 treatment concept is a cost-efficient, graft less solution that provides patients with a fixed full-arch prosthesis on the day of surgery. With only 4 implants this system gives us full-arch rehabilitation with two straight anterior implant and two implant tilted 45º posteriorly. They all planted with a guide and specific tools for this kit. After implantation the denture will get mounted on the planted sites and screwed inside, so it can be removed by unscrewing. In 1998 Dr. Paulo Malo successfully treated the first patient with the All-on-4® treatment concept. Since then hundreds of thousands of patients have been treated with this concept. This method is designed to avoid invasive implantation damages and bone grafting.[8]

Toronto Bridge: is a convenient and non-invasive solution that fully restores a complete arch with permanent teeth using just 4 or 6 implants. Toronto Bridge is a dental prosthesis made of composite resin and can replace up to 10-12 teeth. It was designed and developed by a group of Swedish researchers led by Prof. Branemark who presented it to the international scientific community at the World Dentology Conference held in Toronto in 1982. The All on 4 technique requires only 4 pure titanium implants to be inserted into the bone (the All on six requires 6). After the process of osseointegration (3 months for the lower arch and 6 for the upper), the Toronto Bridge prosthesis will be secured onto the implants. The screws applied in the bone with prefabricated guide that get fixed in the mouth (like mouth guard or retainer that the drill sites are already marked) and with the instruction the implants will get screwed in the bone.[9]

Zygoma (zygomatic) implants: Zygomatic implants have been documented as an alternative for the rehabilitation of the atrophic posterior maxilla with both the classical two stage and immediate loading protocols. Zygomatic implants avoid grafting and sinus lift procedures and therefore contribute to a shorter and more comfortable treatment. Further indications for zygomatic implants include failed conventional implant placement, failed sinus augmentation or grafting procedures, rehabilitation after tumor and trauma resections. In the atrophic posterior maxilla, in general one zygomatic implant is placed on each side of the maxilla, in combination with 2-4 conventional implants in the anterior region. These implants placed with angulation in the zygomatic bone, these implants have more length than normal implants due to their location of screwing (zygomatic bone) so they have more length to get better fit inside the site.

Indication:

Replacement of teeth with fixed implant restorations or the use of implants to support and retain removable dentures are evidence based treatment options with the potential for very high success rates. As all we know implantation is the most conservative restoration available due to its nature .indication of implantation can be different in each individual but mainly we can point out some general factors.[10][11]

Esthetics: missing tooth can be a challenging factor in social life because it can reduce our desire to smile. Following on that can cause isolation from interaction with others, not willing to attend any social gatherings because of that our look is not efficient enough due to the deformity of missing tooth and this can all lead to depression.

Function: our teeth make important role in mastication and chewing food, so due to that missing teeth can cause problem in this matter. In the matter of function it's not just effect only mastication ,it can cause TMJ problems because with the missing teeth occlusion plan will change and distribution of weight load, geometry and CR (centric relation) will change in all the teeth and can cause male occlusion or classes and lead to TMJ complications .

Speech: teeth and alveolar structures are important for production of the specific speech sounds and missing these teeth can effects our way of speaking.

Prevent bone loss: teeth are embedded into the alveolar bone and they help to put the structure of the bone together but when there is missing tooth in that area the structure is weak and due to the movement of the mouth and also tilting of the adjacent teeth, this area can become deform or angled and the bone can reduce.

Contraindication:

As we know implantation is a combination of surgical and restorative treatment, so due to that there are many factors must be considered before starting the process. Patient should be well assessed and evaluated preoperatively to be fit for the procedure. Absolute contraindications, based on immediate surgical and anesthetic risks, are limited to individuals who are acutely ill, individuals with uncontrolled metabolic disease, and pregnant women.[12][13]

Local and systemic diseases are contraindication in this factor, here are some elements that can be main reasons of contraindication:

Patient with abnormal bone metabolism.

Patient with poor hygiene.

Patient with periodontal diseases.

Patient with systemic diseases (CVD, DIABITIES, ETC).

Patient with acute or terminal illness.

Pregnancy.

Before doing any surgical procedure these problems should be dealt with, but sometimes there are cases that need implantation immediately and these contraindication applies to them, so in these cases we cannot neglect the patient needs, so we must act in their favor .in these procedures we must consider all the possibilities and be ready for any complications that can happen through the procedure, all our team should be on call and be ready for these challenges.

Complications & failure:

For us to overcome these challenges first we must understand which obstacles are in our way, study them, learn how to control them, limit our errors and finally overcome all of them and make the perfect treatment plan for our patient. Complications and failures can happen for so many reasons, some can be the doctor's fault and some can be patients. In this part pointing out some human errors and diseases that can be consider as complications.

Total number of implanting being placed: Therefore, the increased numbers of implants and implant-related procedures being performed would have in itself resulted in a greater number of complications even if the percentage of adverse event occurrences remained the same.

Due to increasing in numbers of implantation reflects more doctors and clinicians in varying in their clinical experience, placing and restoring implants so due to that more procedures, more human errors equal to more complications, When first introduced to the profession, endosseous dental implants were primarily placed by oral surgeons and periodontists who had prior experience and training in bone and soft tissue surgery. However, as the number of dentists placing implants increased, more dentists, who did not routinely perform oral or periodontal surgery, began performing additional procedures as part of implant therapy. Regrettably, in some cases this has resulted in an increased rate of implant-related complications. So with increases in demand and need for implantation doctors start to invest their time and values in this field, so due to that they need clinical training and courses to improve their knowledge and skills. Furthermore, the majority of that training was didactic in nature and did not include clinical experience with implant placement and restoration. From another perspective, many clinicians currently receive their implant training from continuing education courses offered by implant companies or private practitioners. These courses are less comprehensive than formal training programs and do not enable the participating dentist to become familiar with the breadth of complications that can occur. Not qualified doctors or lectures in these courses can also cause many future complication.

Aggressive protocol's for implantation: Protocols today include implants placed at the same visit as tooth extraction, immediate provisionalization of the implant following placement, and in many cases the occlusal loading of an implant on the day of placement.

Moreover, implants are being placed in compromised patients and /or in compromised sites where there is inadequate bone and soft tissue to fully emerge the implant. An often quoted statement related to complex cases is: "The more complicated the case the more potential for complications."
Under qualified doctors: Regrettably, many dentists placing implants today lack the education, training, and experience to make that "withdrawal"; in other words, to know what to do if and when an implant complication occurs.[14]
Above we talked about doctor's error (human errors) but unfortunately it's not the only case that plays a role, systemic disorders can also cause bigger and more severe complication, in some cases fatal.
In short, any elective dental surgery including dental implant surgery on patients having active, uncontrolled, systemic diseases may increase risks for further complications and thus jeopardize the patient. Exercising prudence in patient management, together with thoughtful scheduling of appointments, allows the patient to stabilize medically before undergoing implant surgery and is basic common sense. Some cases of systemic disorder that can cause severe complication: [15]

Myocardial infraction (CVD):

CVD has many forms and includes a variety of conditions such as hypertension, atherosclerosis, vascular stenosis, coronary artery disease, and congestive heart. CVDs in general directly affect the blood supply to tissues through a variety of mechanisms. This manifestation alone impairs the process of healing and affects the oxygen supply delivered through blood flow. The presence of adequate oxygen increases fibroblast activity, collagen synthesis, capillary growth, and macrophage activity, which in turn prevents wound infection. These five CVD forms compromise blood flow and reduce oxygen tension and nutrient elements. Thus, we can expect to observe a potential effect on the outcome of the response to osseointegration.

Osteoporosis: Osteoporosis is a skeletal condition characterized by decreased mineral density (mass/volume unit) of normally mineralized bone. The concern that osteoporosis is a risk factor for dental implants is grounded in the assumption that the bones of the mandible and maxilla are similarly affected to other bones in the body by impaired bone metabolism (44). However, since a potential relationship between osteoporosis and decreased oral bone mass or density is controversial it is not easy to assess whether bone quantity and quality in the mandible and maxilla parallel those in the rest of the skeleton. Also of concern is the assumption that impaired bone metabolism as it occurs in osteoporosis may affect osseointegration of implants.

Alzheimer's disease: It is a cerebral degenerative disease of unknown cause that is characterized by memory loss with relatively normal emotional effect. Patient will not be able to function normally in daily tasks , so due to that patient will not be able to differentiate between its medications and also oral hygiene will not be made , so maintaining and prevention measures will not proceed the level of expectation and that can be challenging for care giver and the doctor .

Diabetes: Diabetes is associated with a wide range of systemic complications including microvascular and macro-vascular diseases, altered wound healing, and increased susceptibility to infection. These conditions may increase the risk of postsurgical complications following dental implant placement. In addition, diabetes is a major risk factor for periodontal disease. Dental implants are often used to restore function in partially edentulous patients. In these individuals, the clinician must perform a thorough examination of the remaining dentition and must understand those factors that increase the risk for periodontal destruction, such as diabetes. Further progression of existing periodontitis in such patients may alter the functional load on existing implant-supported restorations or may necessitate further implant placement.

Discussion:

Every individual needs the best treatment possible out there, this is everyone right and everybody deserve it but in most cases it's not achievable. Implantation is a very conservative treatment and success rate is off the chart but that being said it's a very expensive approach for most of people. Some patient aren't able to go through with it in their economical state, it's nearly impossible for them that's why most of them looking for the cheaper version of these kind of restoration like dental bridges. There are considerably less expensive than implantation and less complicated, so it seems like a good choice for the patient with inadequate financial state but they don't have the knowledge to know that these restoration they don't have enough prevalence, not conservative compare to implants, success rates are low and unable to act as missing structures. So as we can see the key factor cannot be only financial factors. Uneducated patients can also be the case, sometimes the patient have financial stability and can afford to pay for the implant treatment but he/she doesn't know about the advantages or received wrong and bias information, so the perfect treatment will get denied and causes

the future problems. So what we can do as a dentist to improve these situation, we can start with informing the patients with better and more efficient information about the procedures, be totally honest with them about every aspect of the way, try to help them with payment plans for those who cannot pay all the operation at the same time (money is not everything for us, but helping our fellow human is). Hope all one day we can achieve all our goal in this process

Conclusion:

During this process we may fight through lots of obstacles in our way, with perfect planning we can create the foundation and built up around it. In implantation various indication and contraindication or complication and failure held hand together in this process and our goal is to overcome all of them and give the patient comfort and the perfect treatment.

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