

ACCEPTANCE AND REJECTION OF THE USE OF PROSTHESIS

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Acceptance and Rejection of The Use of Prosthesis.

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Abstract

The human being has created tools since memorial times to help himself to perform tasks that cannot initially do. In this monograph, it could be found the historical events of the prosthesis and how this one has been evoluted during the pass of the years until the thing that we could see now, there would be an analysis of how the prosthesis and the upper limb could or could not be compatible between them. With the idea to understand how this person fell and how could the prosthesis evoluted one day to change for a better experience or a better.

Keyword: Prosthesis, Passive Prosthesis, Body Feeding Prosthesis, Myoelectric Prosthesis, Neruoprosthesis, Comfortability,

Resumen

El ser humano ha creado herramientas desde tiempos conmemorativos para ayudarse a sí mismo a realizar tareas que inicialmente no puede hacer. En esta monografía se podrían encontrar los hechos históricos de la prótesis y cómo ésta ha ido evolucionando durante el paso de los años hasta que lo que pudiéramos ver ahora, se haría un análisis de cómo la prótesis y el miembro superior podrían o no podría ser compatible entre ellos. Con la idea de entender cómo esta persona se siente y cómo podría evolucionar la prótesis un día para cambiar para una mejor experiencia o una mejora.

Palabra clave: Prótesis, Prótesis Pasiva, Prótesis de Alimentación Corporal, Prótesis Mioeléctrica, Neruoprótesis, Confort,

Index

1. Objective.....	10
1.1. General Objective.....	10
1.2. Specific Object	10
2. Problem Statement	11
2.1. Problem question.....	12
3. Theoretical Frameworks	13
3.1. Background	13
3.2. Concepts	14
3.2.1. <i>Why have people missing limbs?</i>	14
3.2.2. <i>Levels of amputation</i>	15
3.2.3. <i>Amputees</i>	16
3.2.4. <i>Rehabilitation</i>	17
3.2.5. <i>Postoperative problems</i>	18
3.2.6. <i>Final recovery</i>	19
3.2.7. <i>What is a prosthesis?</i>	19
3.2.8. <i>History of the prosthesis</i>	20
3.2.9. <i>Mechanism</i>	22

3.2.10. <i>What is each one for?</i>	23
3.2.11. <i>Possible problems when using prostheses</i>	24
4. Methodological Framework	25
5. Analysis	26
6. Conclusion	38
7. References	42
8. Appendix	44
8.1. Open answers Why don't you wear a prosthesis?	44
8.2. A brief opinion regarding the prosthesis	45

Introduction

In the world, no human is exempt from suffering congenital differences, which could threaten their happiness and quality of life. Losing a limb by focusing on the arms, just one or either both can be a tragedy, because of the important functions that these serve. The longing/desire to recover this limb or feel whole again has led to the development of prostheses. But the human being sometimes ambitious for which he has always tried to improve this. With the incorporation of technology, it has been achieved that these objects have greater functionality and approach to what is a biological human arm; however, that point has not been reached with such a specific level of detail.

The technology can evolve and have good characteristics, but the problem is that the human body, or in this case the human arm has a little complex mechanism that helps in each of the abilities that this one encompasses, these means it is multifunctional, unlike some actual prosthesis. The difference between prosthesis and organic limbs arrive us to question, in the future can we recreate a human limb? Could we create something much functional than the organic human body? The connection between the human body and technology is going to makes us feel normal?

How we can appreciate there is a long topic and can encompass difficult topics, also these are continues growing, therefore we will focus on the most current information and events to understand how the people could feel about these, to see how the rehabilitation or the adaptation is to this new world.

This would be extensive research and very exhaustive analysis because the prostheses are not generic, this means that the prosthesis has to be selected with previous research of the

function and capacity that the users want plus thinking in the level of amputation and the money that can be spent; the first times entering this world should not be so easy, can be because of the situation, because of the confusion, the questions, the doubts, besides that it is a complex issue and with several things, so if you are not with professional support it would be difficult but it is not always easy so the idea is to do or try something for these people.

The statistics and predictions of people with missing members are not good since it is expected that in 2050 the number of people will be double and if this field is not improved it will be increasingly difficult for people.

Justification

The investigation was made with the goal of letting the investigator understand how the medical conditions and the problems in society are related; some many problems and/or diseases around the word, worthlessness the selection for a specific concept was exhaustive, but the investigator start to related topics that could benefit him in the future, in that way the investigator wants to talk about technology and also one of the topics that could be seen from the most modern to the most basic things, it was "prothesis". The investigator also believes that as humans who live in a society, we all should or shall contribute at some point with something that helps others, not to mention that many people always try to avoid these types of issues out of fear of make people feel bad or because they do not know what to do, having anyone in your main social circle in those situations is no reason to ignore the help; but knowing, being able to understand these people, and help them, in my opinion, would make a big change for everyone.

The investigator does not have a close case that could be in him mind at the beginning of this investigation, but how the investigator already said the ideas was that the investigator wants to contribute to society and try to help those how are living a bad experience and it is hard to move on, but also hope that these will not my only contribution just the beginning. and hope that this not only comes out of the investigator part but that little by little everyone understands and helps.

As a last reason, the investigator hope that this research can be considered at the time of his path into university, in this way to be able to continues with a goal and be one step ahead as a good doctor. In addition to serving to the investigator as already mentioned to a new world.

The goal for a future doctor is to understand how the brain interprets situations that can be taken with great impact on the part of the person. And thus, also understand how it reaches the conclusions and capabilities of analyzing the possibility of tools that can improve or help the complement of the human being, based on the fact that the human being is the only living being that perhaps stops evolving thanks to that uses external objects to supplement its needs.

1. Objective

1.1. General Objective

Determine and understand by different analysis as well as opinions how the prosthesis has a different function and comfort depends on the cost along with the type of these and how these relations affect the performance and the satisfaction of the users.

1.2. Specific Object

Identify which are the causes of amputation or the lack of upper limb.

Understand the types of prostheses and the people how to use each.

Inquire about the experience of some users of the prosthesis.

Design a chart in which the information could be and be easy to understand.

Create a chart to describe the different kinds of prostheses there are their functionality and costs, to let make comparisons to guide the possible users.

Instruct using the table the problems that the people can arrive and how can the by helped.

2. Problem Statement

Exposure to life can bring with its innumerable catastrophes which, are from the first second of life. One of the possible catastrophes is the possibility of being born without a member of the body or losing it during life. Thanks to technological advances and the human desire to do or do again the everyday things lead to the creation of limbs replace, by an artificial substitution knowing as prosthesis but this is not a complete and perfect substitution, the technology at this moment have limits and the physical models present also show lack of mobility in comparison to a human limb.

The problem comes when we start to see that the variety of models and characteristics of these have a repercussion in the level of amputation and also in the cost, the biggest amount that a user spends on it could bring a better experience and satisfaction (This does not necessarily have to be true as there are opinions that say otherwise), but it is important to understand that in the world not all the people have the same benefices or privileges to be able to buy one of the best ones. Also, we must consider that the prosthesis is not multifunction as the human limb, how we already said the prosthesis presents a lack of mobility, which leads the user to do a prioritization depending on the life that the user wears or the utility that it will give to the prosthesis. Knowing these ideas, I will try to understand why the reasons and how despite knowing this continues to affect how users can continue to benefit in their lives with the comforts or disagreements that these present.

2.1. Problem question

Why does the recreation of a limb through prosthesis present a great difference depending on the type that is used, affecting the comfortable of the person?

3. Theoretical Frameworks

Below you will find the antecedents of possible relationships with the topic of the monograph or topics that could be added at the time of its development, also some concepts or topics that will help when it comes to understanding the research, in addition to presenting the world that upper limb prostheses present.

3.1. Background

The prosthesis is an extensive field in which we could see a numeral of studies or statistics talking about it, but one thing that I have not seen in all the research I have done until the day, the information if you have not received directly by a specialist is difficult to see by your own, so here are parts of the information that I am going to a group to make my table with simplified information.

In the USA there is an explicit report in which let it knows the reasons why people can lose their upper limb and how many people have born with a deformation that makes their limb unable for use, also show us statistics from 2018 in which tells how many people are in those conditions the reasons. (R. Frontera & K. Silver, Essentials of Physical Medicine and Rehabilitation: Musculoskeletal Disorders, Pain, and Rehabilitation, 2018)

Figure 1

Table V. Challenging activities reported by survey participants.

Activity	Detailed description	Frequency
Household chores	Repairs and household maintenance (i.e., car repairs, shoveling snow, gardening, electrical work); general housework (i.e., vacuuming, dishes, cleaning); use of tools (i.e., hammer, power tools, shovels); heavy lifting; climbing (i.e., ladders)	40%
Sports	Cycling; swinging sports (i.e., golf, baseball, tennis); monkey bars/climbing; swimming; exercising; rock climbing; boating (i.e., canoeing, kayaking); ball sports (i.e., basketball, volleyball)	30%
Hobbies	Playing a musical instrument (i.e., guitar, piano); motorbike and airplane control; woodworking and crafts	22%
Activities of daily living	Food preparation and eating (cutting food, peeling, slicing); dressing (i.e., zippers, buttons, laces, pantyhose, ties); hair styling; typing; washing/personal hygiene; childcare; driving	19%
Social activities	Intimacy (i.e., sex, hugging); clapping; shaking hands; passing through airport security; dancing	8%
Occupational activities	Operating heavy machinery and large vehicles (i.e., farming equipment, trucks); training to be a doctor, surgeon, chemist etc.; law enforcement	6%

Ohio state university has done to an investigation in which in hand off a lot of studies organized the information and the orientation of the ideas and likes of the prosthesis users. (The Ohio State University, 2018)

The types of prosthesis are related to the lifestyle that the user's follows, thus before the purchase of a prosthesis need to know for what the user wants, how much money do the user can spend and which type it prefers in way of compliance. (J. Cech & Suzanne, 2011)

After wars, we could appreciate studies that could be old but can help in the orientation in the development of this investigation. (McFarland, 2010)

One of the common options is to live the limb without a prosthesis but these could bring pros or cons in daily life (Bloorview Research Institute & Institute of Biomaterials and Biomedical Engineering, 2007)

An idea of how works the market in the USA about prosthesis (Bhutani, 2018)

We need to know why a person must use a prosthesis, that means understand the upper amputation. (World Physiotherapy Network for Amputee Rehabilitation Project)

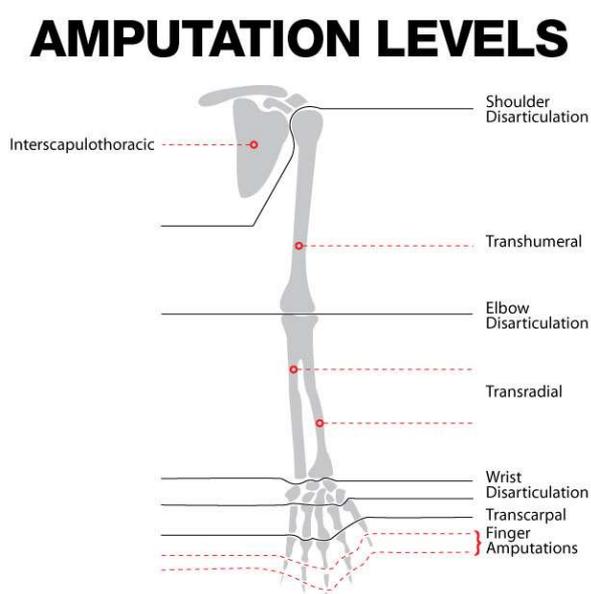
3.2. Concepts

3.2.1. Why have people missing limbs?

There are two options by which a person may have a limb missing, the first one is the amputation; an amputation is the surgical removal of part of the body, this can be a consequence of a severe infection, an affectation by gangrene (often as a result of peripheral arterial disease), serious trauma or the limb is deformed and has limited movement and function, the last case it also opens the door for us to understand the second option for why a person might not have a body part and this is because in the belly the growth is inadequate creating as a consequence a deformation knowing as "limb reduction", there are not a specific cause but the studies have

given us possible risk factors that could incite that a baby born without a limb. Some causes are the exposure of the mother to certain chemicals or viruses as well as certain medications while pregnant. There is also the possibility of the mother's exposure to tobacco smoke (although more research is needed).

Figure 2



Note: The image allows us to see from where the main cuts for amputations can be made, but at the same time it gives us an idea of where it starts or at what level the prostheses are placed.

3.2.2. *Levels of amputation*

As it says what we just read there are moments in which we must amputate but this means that the incision is not rendered in the same place it needs a study to see the best place to make the separation, as these have specific spots. Some concepts have weight now of design the amputation level, when you leave more limb the mobility is better, but the risk of expansion or propagation of the problem is greater, in addition if you take more limb the mobility is less but the risk is also less. In the figure 2 you can see something important which would be the initial term in three of the possible amputations which are disarticulation, this works in that, as the name says, the incision would be located in the articulation making it somehow remain more

conservative for the member, but of course, this is not for comfortability it is for a necessity necessary. In some cases, it is known as provisional or definitive amputations since depending on these it allows better treatments in the future, such as reconnections or similar treatments for the best possible use of the limb.

3.2.3. *Amputees*

The reason why most of these data are going to be approximate is that most of the investigations and programs of many governments say that not all cases are registered for different reasons, for which an exact precision could not be made. Since the research is not oriented in a specific population or a specific location, but rather that they simply meet the requirements of having or possessing a prosthesis. The data that would be found is from the United States and Colombia. There is approximately 1.8 million people live with the lack of some or some part of the upper limb, being around 1 of 200 people, and Approximately 185,000 amputations occur in the United States each year, which approximately 41,000 persons or about 3% of the population per year are upper limb amputees. If we compare the upper amputation, we can see that it is less than the lower one.

Amputation can originate from multiple reasons, one of which is trauma, having around 45% to 65% depending on the investigation period, having a rate of approximately 3.5 per 100,000 of possible causes, since they are many events that can lead to them, for example, burns in the use of explosives. or recreational gunpowder, tool misuse, and even firearm damage, although not all are possible causes. Although there has been a drop in the number of trauma cases in the last decades, this is attributed to the improvement of jobs and the passing of some confrontations. finger amputations are the most common (2.8 per 100,000). Hand amputations

from trauma occur at a rate of 0.02 per 100,000. Excluding finger amputations, traumatic transradial and transhumeral are the most common upper limb amputations.

Another common cause is vascular diseases, these are any disease or condition that affects the circulatory system, or the system of blood, vessels that carries blood from the heart through the rest of the body. This includes diseases of the arteries, veins, and lymphatics, and disorders of the blood that affect circulation. Some examples would be diabetes, anemia, hypotension, among others. These come to have around 54% of the causes in some moments. Although they will mainly affect the lower extremities. Among the diseases that can result in amputation, we can find cancer which does not present a great weight but is still part of the most frequent causes with around 2%.

3.2.4. *Rehabilitation*

Being in a world in which not all things are made for people that have a lack of limbs a tool that helps in it makes sense; humans mainly must adapt and find a way to be part of society. When a baby is born with limb reduction specific in the upper section the growth of the kid is directed or taught by another path, for the development of skills, also to people who born with limbs but lost them it is more difficult in rehabilitation because the learning from kids and the style of life changes. Since there is no educated social culture for this type of case, in addition to speaking that most things were initially developed for people without disabilities. Human beings do not have a remarkable evolution like animals, since as already mention they can create tools that facilitate and allow them to do things that would be difficult without them, this place in daily life. In the same way, when a person undergoes an amputation, he must go through a process known as rehabilitation which will allow him to understand his body now but with a missing limb, as well as how, as already mentioned above, to be able to become part of the society and

adapt to what is not suitable for them. Rehabilitation after amputation in addition to teaching their new lifestyle can also help them psychologically because this can be a strong blow for the person.

3.2.5. Postoperative problems

Like all surgery, the recovery not only depends on the disposition of the patient but also on the body itself in the acceptance of the surgery or in the added components and that is why many times complications can be seen, and the risks increase with age. Both in the postoperative period or the same surgery.

3.2.5.1.Short-Term. At the beginning and within the short term, people after amputation surgery may experience skin alterations: itching, inflammation (creating different sizes of the stump), fungal infections, abscesses, dermatitis, the spontaneous opening of the scar, necrosis of the stump, among others. Formation of a neuroma can occur when the severed nerve in the amputation heals and that can cause neuropathic pain, the formation of a bone spur at the end of the amputated bone.

3.2.5.2.Long-Term. In the long term, somewhat more complex and complications can be seen, these could be conditions of the spine, hip, and knee when the center of gravity shifts and causing postural and biomechanical changes producing pain and disorders when walking, an increase of up to 80% of cardiac output due to overexertion, increased energy expenditure when walking, being higher in patients whose amputation is due to cardiovascular diseases, decreased kidney function. Or even neuronal diseases such as phantom pain, since surgery can be a big impact.

However, the use of prostheses to replace the amputated limb can rebalance a large part of the long-term complications, although this requires physiotherapy treatment to help you adapt

to the new situation as mentioned in the rehabilitation. And likewise, not everyone can adapt to the new interaction that they must do, for convenience, or the body itself may reject the idea.

(could found some opinions in the annex)

3.2.6. *Final recovery*

After surgery and rehabilitation, approximately 73.2% of patients return to work and have a life that they agree is adequate, while approximately 33.75% of people reject prostheses and express a difference when performing some activities are unable or unwilling to return to work.

3.2.7. *What is a prosthesis?*

There are completely advanced types of prostheses, both aesthetically and functionally. Others are not at all aesthetic and can be used under a garment, since they are made with wires, rods, metal, and many of them have certain movement limitations. The prosthesis is a concept that originates in the Greek language which was used in the field of medicine. Prostheses are also known as the replacement of a limb, artificial limb, or prosthetic limb; in these times prostheses are the artificial substitute for an organic limb that has been lost due to different causes, these can be by birth or by some physically traumatic event. Even though the loss of a natural limb is irreplaceable, these prostheses are called "substitutes", considering that they have been designed to improve the lives of amputees. In the case of this work, the idea of upper joint prostheses is to cover the basic needs that the arms allow or to perform at least tasks that the person wishes to perform, a hobby, a task, or specific tasks of daily life. In this way, understand completely advanced types of prostheses, both aesthetically and functionally (specific information can be found in mechanism section).

3.2.8. *History of the prosthesis*

The history of prosthetics dates to the supplementary leg around 1500 BC. and, since then, it has been in constant evolution. These are appreciated thanks to a discovery which shows that it was part of the ancient Egyptian culture, this culture is at such a remote time lacked the complexity and advances of modern anatomy and orthopedics, which is why these only had the purpose of supplementing the missing part, and in this way to be able to make the person have a sense of completeness, from this discovery there are many stories by historians who explain why these. Then we can see how in the high Middle Ages around 400 to 1000 AD. prostheses despite only having the idea of hiding malformities or battle wounds are used from the first hooks and shovels of ducks. In the Renaissance we can see how the Greeks and the Romans made great contributions themselves in medicine and the field of prosthetics, these thanks to new concepts of art, philosophy, and science also improve the materials and the shapes that these have.

In early 1500, the first iron hand according to certain historians was made between 1504-1508, the fingers can be bent passively, with the help of the opposite hand, and locked in position by a ratchet mechanism, the extension of the fingers works by spring pressure. It has two hinges in the upper area of the palm, providing movement in the four fingers, flexing like hooks so that it could hold the sword. In addition to the function, they added aesthetic details such as sculpted nails and smaller details like knuckle wrinkles. The concept of these types of prostheses and the idea can be reflected in the story of "Götz of the Iron Hand" and other knights.

While in the mid and late 1500 Ambroise Paré a barber and surgeon who is known to many as the father of modern amputation surgery and prosthetic design. This thanks to his introduction of modern amputation procedures introduced in 1529 in the medical community and the development of new prostheses in 1536 for upper and lower limb amputees. Besides, he

invented an over-the-knee mechanism, which consisted of a peg leg that could flex at the knee and a prosthetic foot with a fixed position, an adjustable harness, knee lock control, and other modern engineering features that they were the basis for today's prosthetics. His work demonstrated, for the first time, that the human body and how a prosthesis should function had been utterly understood.

17th to 19th centuries in 1696, Pieter Verduyn developed the first prosthesis below the knee without a locking mechanism, which is said to have been the main basis of today's articulatory mechanisms. In 1800, Londoner James Potts designed an elaborate prosthesis with a laced wooden leg, a steel knee joint, and an articulated foot controlled by tendons of catgut from knee to ankle. In 1839, William Selpho brought the leg to the USA, where it became known as the "Selpho Leg." In 1843, Sir James Syme discovered a new method of ankle amputation that did not involve a thigh-high amputation, which was a big change for the amputee community. In 1868, Gustav Hermann suggested the use of aluminum instead of steel to make artificial limbs lighter and more functional.

20th century onwards thanks to the First and Second World War, plus the civil war in the US, in addition to other confrontations, the levels of amputees had an increase, but only in the US civil war was a technological advance created in prosthetics. But that if after the first great war, the Army Surgeon General led to the creation of the American Orthoprothesis Association (AOPA), thanks to the call made by veterans for the unsatisfaction of technology in prosthetics. The US took the reins. and started an improvement plan. The main improvement that was implemented was the materials with which they were made and the operation of these, then with the advancement of technology the prostheses began to have chips and circuits which would lead

them to have electrical connections, and with that little, too little was carried over to the current ones, which have more complex connections but simpler to use for the wearer.

3.2.9. Mechanism

When choosing a prosthesis, you must take many things into account, since these are not going to be an exact substitute for an organic upper limb, so you must have an idea of the usefulness and the reason in which you want to use the prosthesis. The prostheses being one step behind in terms of the multifunctionality of the organic upper limbs should be chosen according to the reason for which it is to be used since the mechanisms change a lot and not everything will work for everything; in the same way, we understand that the prostheses they must have different types for this classification or purchase of their functions to exist and the operation of the prostheses are indeed reflected depending on the amount of money to be paid, this will give you more complex models or by default simpler which they bring with she greater comfort and more functionality.

3.2.9.1. Passive Prosthesis. A passive prosthesis does not allow active movement of any of the joints. These are the lightest devices because they contain no motors and few or nothing of mechanical articulation mostly focus on the aesthetic.

3.2.9.2. Prosthesis with Body Feeding. It is so named because the prosthesis is moved by the individual's remaining body. Typically, a harness with a strap that sits over the lower third of the scapula is connected to a cable that operates the device. Their benefits focus on weight and durability, they can be waterproof, and they can provide feedback to the user based on the tension in the control cable.

3.2.9.3. Myoelectric Prosthesis. While the energy of a system powered by the body comes from the movements of the user, an externally powered prosthesis works with batteries contained within the system, it works through the interaction of electrodes, placed mainly in the muscular area of the arm, which allows the artificial hand can move, open and close.

3.2.9.4. Neuroprosthesis. At the moment it is not something very common or complete, which is why it is not the first option of many, but it presents a possible way to introduce a new generation of prostheses, since these would exceed the capabilities that myoelectric present, achieving a better understanding of movements as they are direct receptors of movement signals, in addition to the fact that improvements such as a two-way interaction could be implemented, which would mean being able to recover the sense of touch. These work through implantation at the high levels of the cervical spine.

3.2.10. *What is each one for?*

Even so, knowing the types of prostheses that there are, we must take into account something else and that is how it will be performed, there are some characteristics of prostheses that will be seen more in some type, in the case of those that are with body feeding, you will usually find the ones of a 3D model that at this moment are considered a boom due to the ease of these since the costs are not high compared to others besides that it allows you to make modifications. These, when seeking the greatest economy, tend to be quite simple and help with the body, which is why they have a pulley for mobility in addition to other mechanisms. Instead if we already want to have something more sophisticated and that gives us fewer complexities as the same users say, we can buy myoelectric which can already come with better materials, easier implementation, and more capabilities such as better articulation or independent mobility of the

fingers. But despite being the best, many even prefer the passive ones, since in some situations the only thing they want is to be able to have a much more practical, simple and effective use, but obviously, these become less in the number of things you can do.

For this reason, an opinion is created in which many people choose not to use them because of the cost and the skills that some that are economical give you. Also, something very common that is seen is that they are chosen depending on what you do since some are more focused on specific things, an obvious example is that people who tend to be in social events prefer rather than one with various skills, one that is more aesthetic and makes eyes wander, while other people who do heavy work or other types of activities with fewer people prefer a hook or a myoelectric since they are not interested in being seen only that it complies with the required performance.

3.2.11. Possible problems when using prostheses

Using prostheses is not really for everyone, it can be a pretty good idea for people who do not have a limb but in addition to the interest that they give at the time of rehabilitation, it is necessary to take into account that the same body can generate a repulsion in front of this, since first if they are of mechanical support the body can generate other problems such as scoliosis due to the strong and late use of the pulley to be able to use the mechanism, and this when using it day by day it can generate frustration or additional discomfort, but it can also be seen in more complex models such as myoelectric ones, since it can lead to muscle atrophy or simply that the body stops responding. This leads to many people, in the end, preferring something simpler or even preferring simply not to use anything.

4. Methodological Framework

This monograph is developed by a homogenization between investigative and experiential analysis, this is because the prosthesis can be designed with bases in anatomy or orthopedics concepts, but still exists people that prefer to not use prosthesis also some use some sophisticate or use a little less complex. This monograph is developed for explanatory and documentary purposes to achieve better clarity about the world of prostheses and the people who live with them, at the same time it seeks to create a facility for the people who are entering and seek to learn for various reasons about this matter.

The idea is that through what is known about the anatomy and mechanics of arm prostheses we can do an investigation on why people think or say opinions in favor or against them and to have greater clarity of this the idea is to be able to survey only a few people with the three types of prostheses that the others address and know what they think of them. (Having opinions for and against these, regardless of whether it is a personal and not universal opinion, for this there will be supplementation of the theoretical part)

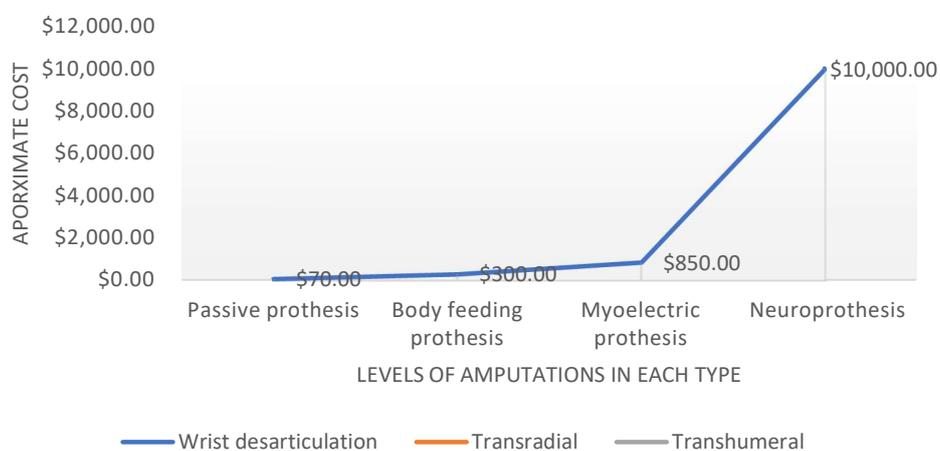
5. Analysis

The analysis of the monograph is going to show how the mechanical physics of the prosthesis works and why it is the way it is. First will be explained the types of prosthesis continues with the theory and what is said by the mechanic. Next to these will be shown a comparative table which contains the variation and facts of the mechanics physics, allowing to understand why people can show rejection or incompetence towards prostheses. All this information will mainly be based on the responses of Google forms of people who assist, help, and are part of the amputee community; The information found in forums or on internet pages will also be used to allow us to better understand and have an analysis of the way of people's opinions.

When we talk about prostheses, we know that they are human tools to replace a part that is no longer there, arm prostheses consist of two concepts to be understood. The first concept would be mechanical taxation, which would be applied for passive prosthesis, or fed by the body; While the second concept to know to be biomedical, this it would allow us to understand circuits and the anatomy or reactions of the body in a deep way, helping to achieve myoelectric prostheses or neural prostheses. But even something that is seen is that people use the simplest prosthesis or even do not use them, since they get used to using their member like this since many prostheses give problems with the circuits, with the quality of this making the cost go up to get one without so many problems.

When we talk about passive prostheses, we are talking about a type of prosthesis that before fulfilling a replacement of the functioning of a lost section complies with making the replacement look different, although we can also see prostheses that serve to simply give support

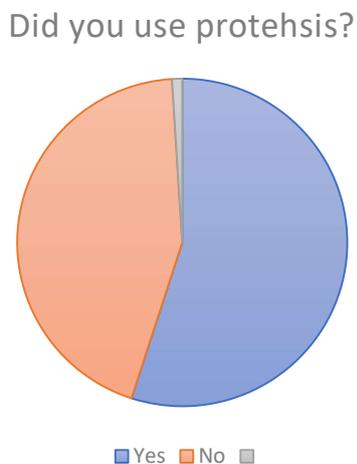
to the arm as would be the bucket of the hook, that simplicity also helps to make the cost of this extremely low. The body-powered prosthesis has a more complex physical mechanism but without entering anything electrical, here we can see a large part of the prostheses made by 3D, these work through supports of the body allowing the prosthesis to perform articulatory movements through specific movements. Here the cost would begin to rise but it is still quite economical, at this point that is why most of the population is found. When we move on to myoelectric prostheses, we are talking about having electrical mechanisms, which means that support is no longer needed, which is generally criticized for muscle or joint problems. With this prosthesis, we can see the replacement of a large part of the joints allowing the person to do more things since it will work through the muscles or minimal movements of the rest of the arm. Finally, we would already have the most sophisticated prostheses which will be the neuronal prosthesis, this is more complex since it is connected to the nerves that is why it requires a previous surgery, this allows greater comfort. The problem and for what not many people use it is since it becomes awfully expensive in addition to the materials and the handling that it has in the background.

Table 1*Approximate cost of prosthesis types*

Note: The table has a compilation of data in which you can see an approximate cost of prostheses depending on their category or level of amputation. Own work.

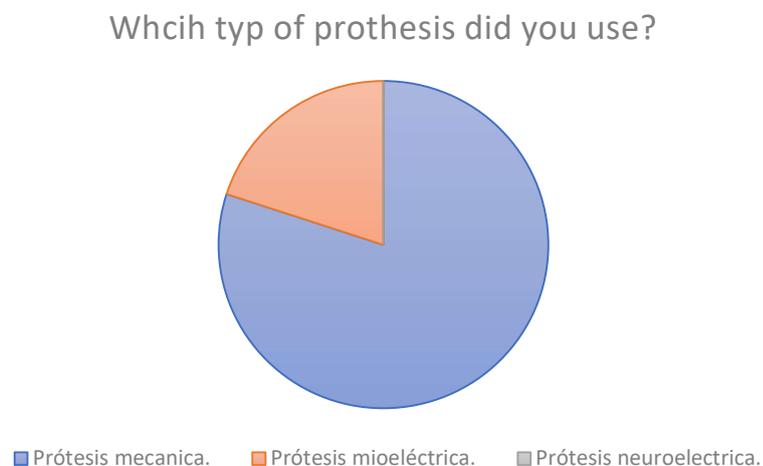
It is difficult to get an average or an approximate value of a prosthesis since they have many variations such as, the level of amputation, this refers to how much prosthesis is needed, the larger it is or requires supplementing more prosthesis, this will be more expensive, another variant would be the material, and the brand. These variations would be for each of the four categories that we mentioned, each of these categories has its sub-models complicating the compilation of this. That is why to look at price comparison, we looked at three levels of amputations that the four categories can present and thus achieve a comparison.

Figure 3



Note: This graph taken from the survey carried out allows us to appreciate the number of people who prefer or do not use the prosthesis.

At the beginning of the survey, the first question that the respondents would find would ask them if they use prostheses or not, the answer will not bring an open question to know why not, to have information from the point of view of those who use or not and reach an understanding of both parties for the resolution of the main question. With only 44 percent answering no and 55 percent yes.

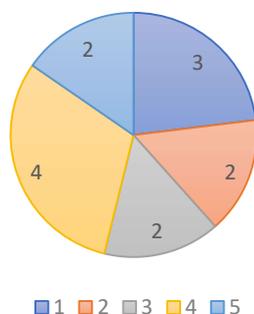
Figure 4

Note: This graph taken from the survey carried out was an attempt to find the number of people who can use the types of prostheses and associate it with the table previously seen or with the comments attached to it.

Figure 4 shows that neuronal prostheses are not owned by anyone. This can be intuited or inferred that within the assigned group there were no subjects who could have these, either because of their socioeconomic level or because of the little or no existence of this in Colombia. The latter stands out due to the difference in the support that this has in power countries such as Indian states in which this type of prosthesis is much more common to improve the prosthesis and reach a point in which there is no difference, But Colombia has not found the same level of support from companies that do this. While the other types of prostheses as shown in table 1 being within a value and easy accessibility if they are found in Colombia and are the most popular.

Figure 5

Level of satisfaction from 1 to 5



Note: The opinions of the people will be evaluated from 1 to 5 with 5 being the maximum value for the satisfaction with which they live thanks to their prosthesis, in addition to this, there will also, be an open response which will help us to understand what the most appropriate type of prosthesis for each type of situation or person would be.

In figure 5 we can see through the mentioned Google forms the level of satisfaction that some people think that prostheses provide, besides, some answers come accompanied by some comments which allow us to reach an analysis and conclusion of the advantages and disadvantages, likes, and dislikes that they think some prosthesis have. As can be seen in figure 5, prosthesis users have varied opinions since they do not all share the same physical characteristics some of them can have lost their limb by an accident or born with a missing limb, nor do they have the same prostheses or did the same things as day life so we can appreciate the difference and achieve conclusions on each type of prosthesis.

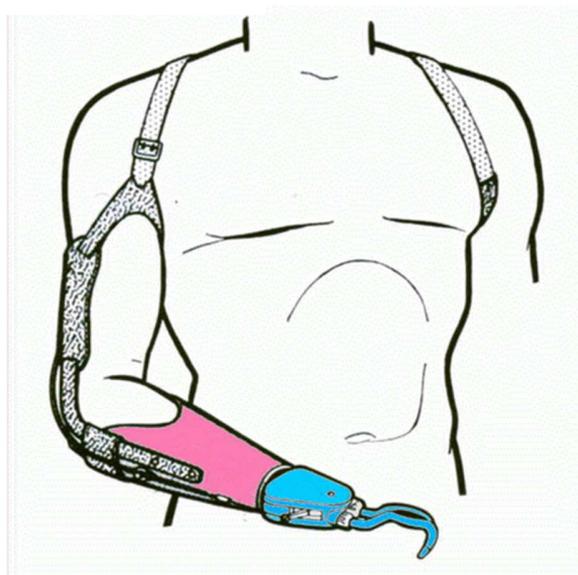
Figure 6



Note: The image shows basic rubber prostheses that try to find the most perfect resemblance to the limbs of the human being with little functionality.

Starting with the opinion of basic prostheses; opting for this simpler option allows their operation more simply. Some of the examples that we can see in these cases would be the replacement of rubber appreciated in figure 6, so not interested in the function that the prosthesis can provide but that the idea is to lower the looks and have discretion about the missing member, these being the prostheses with a more human image possible. Another option would be the grapples or hooks since they do not have an overly complex system, they simply have an arched shape to perform things such as a grip or support for the interaction of possible actions that require not the use of precision but if force or fast handling.

Figure 7



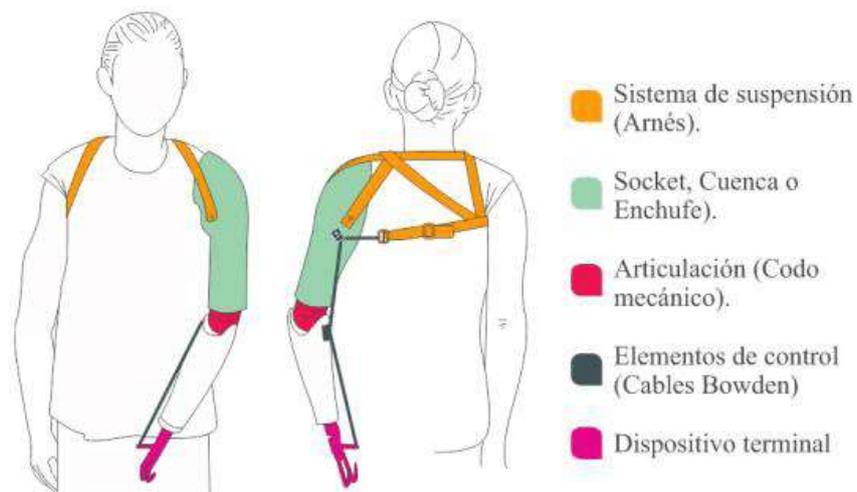
Note: In this image, we can appreciate by colors the main parts that make up a body-fed prosthes from the trasradial cut, to analyze it.

We move on to the following type of prosthesis: those fed by the body, in we can already see a diversity of opinions in a more evident way. We can see that there is a popular opinion regarding the displeasure or cons that this type of prosthesis brings, we see that many refer to the fact that the body-powered prosthesis generates pain and pain in parts of the body.

The cause of the manifestations that users present is causally related to the type of control that the prosthesis handles. As can be seen in figure 7 and/or eight, the prosthesis is placed at the level of amputation, but after this, as in the case of figure 8, as it is an amputation of higher percentages, it requires more parts to comply with the extremities. Removing this variant from the side, what characterizes this type of prosthesis is the body feeding in these two figures, it was similar through a harness behind the back and between extremities and chest which serves as a pulley for the contraction of the desired joints. The different levels of amputations or missing limb contribute to the complexities of the prosthesis in comparison with the first type of prosthesis explained, this requires an operation and as it can be compared between the figures

already mentioned, they have a common base, but a part arrives in the that already begins to have more parts depending on how much percentage must be supplemented.

Figure 8



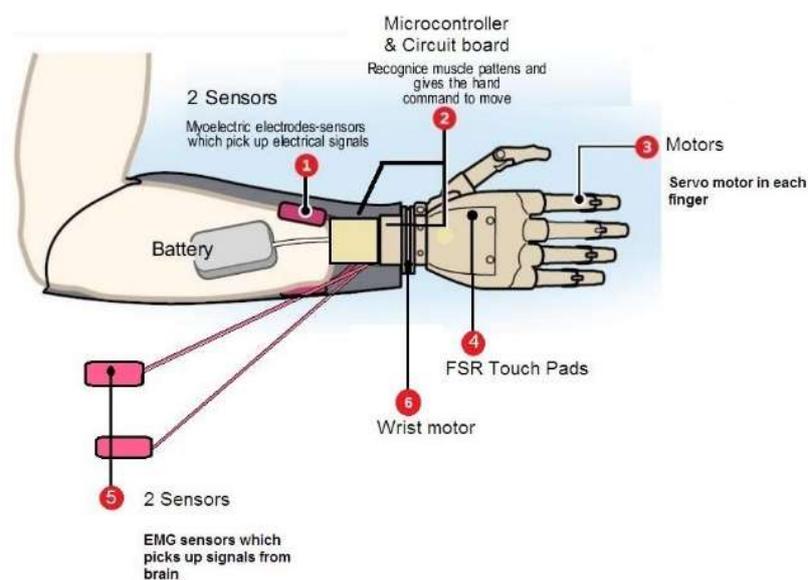
Note: Image of a body-fed prosthesis from a transhumeral section having more part than figure 6.

In general, these parts of the body are not used to the movements that the prosthesis requires to achieve operation, many causing non-anatomical movements producing the annoying ones mentioned. This is not a mandatory consequence, since people who express these cases, or people who adapt correctly, are registered. This causes users to prefer not to use a prosthesis in these cases.

The next type of prosthesis is myoelectric, these do not work through a body feed through using harnesses to generate pulley, this allowing greater comfort or less possible discomfort. The operation of this as a step with the second type of prosthesis presented regarding the first one is much more complex since it works through sensors that capture the movements that the muscles try to make and are manifested through circuits and programming in movements, allowing be more anatomical and uncomplicated by non-routine actions. This would generate that they are of greater care and a higher cost; But even so, being the most common prosthesis, even though users who have it describe them as the best, it may not be easy or within everyone's reach, since the body-fed prosthesis is a common way to people get this through 3d models on the internet;

As we see in the first annex 1, many those.

Figure 9



Note: The image shows through a myoelectric prosthesis from a transradial cut the parts of the prosthesis, and main characteristics.

who responded to the survey refer to the materials used in 3d printing, allowing this to be done in a more particular way today. But in the case of myoelectric, as they require more components, they require the help of experts or connoisseurs of the subject, but as soon as Colombia grows in

this subject, people find it difficult to have this type. This type of prosthesis is related to problems of quality and investment costs, generally, when there is a greater investment, it is possible to achieve prostheses that allow greater control of the grip or mobility of this, but when the investment is not great, there are many cases in which the prosthesis not only allows the operation in specific actions, sometimes slowing down or restricting the possible actions. This same reason that users with all prostheses reject them, as evidenced in annex 1, people express themselves by saying that it is not something essential, comfort, difficult adaptation, and better control with the limb without anything. Although you can also find more opinions or points of view.

The last model is neuronal prostheses, in this case, cave clarifies that no user of this type was found within the population to which the survey responded, this can be referred to as in table 1e expresses the high cost that this can reach have in addition to the requirements that it requires to become a user of it. Colombia, as mentioned above, does not have large fields of this subject, if they exist but they are not comparable to those of countries such as the United States or the United Kingdom. But despite not finding a person who can express an opinion more directly to me, this is considered the most complex prosthesis that exists now and with more ambitious ambitions.

This prosthesis works like myoelectric ones, instead of using muscle receptions, it looks for receptions of the nerves specifically of the electrical pulsations that they send, many times this requires surgical interventions, so it presents a long process for the use of these, although also many consider this type of prosthesis as in a "beta" state since they are not yet generalized or continue and present many problems for which they are still being perfected.

But these are not the only options that can be had, many people do not think and do not like the use of a prosthesis, the opinion becomes very personal so it could not be reached an absolute generalization, but What can be understood with simple analyzes is that many of the users begin to have more control over their daily actions with their limbs without prostheses, and managing to do things like play or write, for which they come to take prostheses as a burden or a nuisance.

It is important to take into account the variables that allow the compression of the rejection of the users against the prosthesis; As is known, the prosthesis handle a great variety of different characteristics, they only share basic anatomy, thus making it more or less pleasant for people, while the prostheses handle different types, and each one can be built with different materials, different Techniques, and depending on the form, missing percentage can affect the final consumption of the opinion.

It is explained that approximately only 33.75% of the people who suffer from amputation and resort to the use of prostheses come to involuntarily reject the prosthesis, but this data is affected by the socioeconomic echo of the population, since there are people who come to not use a prosthesis due to the fact of not being able to buy one, making them get used to using their limb in the way it is and not wanting a prosthesis in the future, apart from the socio-economic, people often refer to prostheses as an annoyance becoming somewhat annoying and annoying than something positive or a solution.

6. Conclusion

Collecting the information obtained thanks to the responses of the google forms survey, and the selection of information, the solution of the original problem can be reached. An attempt was made to seek by this method a concept of reality through the opinion of those who completed the form and have a little support or try to find the solution or explanation in this respect through the information and books on the subject. The objective of building a table is if it can be done and it gets better during what I have studying medicine is to help families that are entering this world which is quite large and initially it can be hard and difficult if you do not have an accompaniment and there is the possibility that the doctor cannot give great opinions due to lack of first-hand knowledge, therefore, when collecting opinion data through forms, forums, videos, reach conclusions in which they can be manifested in the table, along with links, images, data that may allow the person a simple basic search.

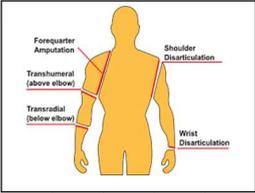
Medicine is a science that has been with the human being for more than six thousand years, which has allowed its evolution and improvement. The malformation or alteration of the people has caused what is known as limb reduction, which causes the limbs not to develop in the same way, causing it to have a percentage of the complete upper limb, there is also a lack of percentage of the limbs Through accidents or traumas, this arises when at a specific moment the arm or limb suffers a severe lesson which the solution to avoid the worsening of the problem is greater is cut depending on the best option at certain levels the extremity. This surgery is known as amputation. The causes of this are varied from health problems to accidents by fire, firearms, among others.

The organization and classification of prostheses have many sub-categories, starting if it is exoprosthesis or endoprosthesis, these being the first prosthesis that can be removed at will, while the others even require surgery to be placed originally. From these would come the types of prostheses, passive, fed by the body, myoelectric, being prostheses of the exoprosthesis category, while most of the myoelectric ones, the last type would be endoprosthesis since many would require or the concept at least seeks the reception of the sensory part of the nerves. remaining.

As in the first annex 1 it is shown, people managed to give an opinion about their experience and criteria regarding prosthetics, but in addition to this we can see in the forum links, and people sharing their opinion of different types of the prosthesis in their day to social networks. day.

Throughout the development of this monograph, many data were collected with the idea of creating the data, resulting in the annexed 1 excel file or figure 10, collecting more concretely the opinion of the users of these and public opinions. The document that contains the table has an initial section, in which you can find a page that summarizes the most important concepts of the prosthesis, going to the categorization of these, and then showing the opinion of the people regarding each type of prosthesis, Here it is worth clarifying as it was already mentioned that the neuronal prosthesis was complicated in finding data or opinions first hand since this is still something new, expensive, and with few users, not having found a copy in Colombia within the group that responded The survey can support Table 1, which shows that the cost of this is very high, preventing people within a country like Colombia from being able to easily possess it.

Figure 10

Introducción						
Categorías de prótesis		Exoprótesis: Estas son consideradas aparatos ortopédicos pues pueden ser retiradas a voluntad del paciente. Motoras: Para realizar funciones básicas. Sensoriales: En pocas palabras se refiere a las prótesis mecanizadas que interactúan con el entorno.		Endoprótesis: Son aquellas que necesitan cirugía para aplicarse.		
Tipos de prótesis		PASSIVE PROSTHESIS	PROSTHESIS WITH BODY FEEDING	MYOELECTRIC PROSTHESIS	NEUROPROTHESIS	
Opiniones		Una prótesis sencilla la cual no te permite realizar acciones complejas, o interactuar con el entorno, pero si te asegurara una de las mejores impresiones visuales, al enfocarse principalmente en esta. Opinan que llegara momento en el cual así solo la usas para eventos sociales lo vas a considerar un estorbo al no ser mas que un artillajo sobrante e impidiendo usar de la mejor manera tu miembro.	Esta prótesis te permitirá cumplir con tareas sencillas, y/o muchas veces pesadas y presenta una facilidad de obtención. Esta prótesis solo requeriría además del cuerpo de la prótesis de arneses que estarán ubicados por tu espalda y en el momento que hagas una serie de movimientos permite la contracción de la mano, de manera rígida, y en su respectivo caso permitirá también la contracción de la Articulación húmero-cubital. Ocasionalmente personas presentan molestias articulares en las zonas designadas para el arnés, sean maltratos musculares u ocios.	La prótesis mioeléctrica es de las mas complejas en el mercado, esta contaría con mecanismos eléctricos, que, a través de los movimientos de los músculos restantes, permita la interpretación a través de codificación de acciones, esto llegando a realizar agarres y movimientos complejos, y requeriría de un mayor cuidado. Los reclamos frecuentes serian la cantidad de dinero a invertir para tener una buena prótesis de este tipo.		
Hables para Colombia		Hables fuera de Colombia				
Fabrilaap Dttrobock Prótesis avanzadas Materialización 3d TouchBionics x x		Global Glosary				
Reference						

Note: Document in which is the compilation of key and relevant information, in an organized and guided manner for the possible use of people outside the monograph.

As can be seen in figure 10 in the part where it says "Opinions" we can see what has already been mentioned, as the prosthesis is not necessarily an absolute help, but rather it can present discomfort to the point of preferring not to use it, but also It is important to understand that there is a direct relationship with the quality of the prosthesis and the cost. A higher value will allow a better experience due to the finishes, the materials, the capabilities it gives, the visual presentation, among other things. This often makes the user feel and have a better experience, but the problem is not the absolute answer to the fact that people prefer not to use prostheses since many also without having prostheses with high costs continue to be satisfied with them. This would depend more on the upbringing and the capacities that the user achieves to carry out more or fewer actions without a prosthesis or also on the idea of him compared to why he uses a prosthesis or because a part of the limb is missing.

Finally, looking at the question, why does the recreation of a limb through prosthesis present a great difference depending on the type that is used, affecting the comfortable of the person? Comfort is not explicitly related to the type of prosthesis since the type of prosthesis

would depend more on what you are going to use the prosthesis for or what actions you do in your day-to-day life. What, as mentioned above, can affect the user experience is the quality of the prosthesis since it can handle more qualities, acceptances, and adaptations to each type of person.

7. References

Bibliography

- J. Cech, D., & Suzanne, T. M. (2011). *Functional Movement Development Across the Life Span* (3th ed.). Saunders.
- McFarland, L. V. (2010). *Unilateral upper-limb loss: Satisfaction and prosthetic-device use in veterans and servicemembers from Vietnam and OIF/OEF conflicts* (Vol. 47). Retrieved from <https://www.rehab.research.va.gov/jour/10/474/pdf/doaj/mcfarland.pdf>
- R. Frontera, W., & K. Silver, J. (2018). *Essentials of Physical Medicine and Rehabilitation: Musculoskeletal Disorders, Pain, and Rehabilitation* (4th ed.). Elsevier.
- R. Frontera, W., K. Silver, J., & D. Rizzo, T. (2020). *Essentials of Physical Medicine and Rehabilitation* (4th ed.). Elsevier. doi:<https://doi.org/10.1016/C2015-0-05620-9>
- The Ohio State University. (2018). *ONE HANDY BARROW*. Ohio. Retrieved from <https://u.osu.edu/wheelbarrows/upper-limb-injury-statistics/#:~:text=50%2C000%20new%20amputations%20every%20year,limb%20amputation%20is%201%3A4&text=existence%20of%20350%2C000%20persons%20with,30%25%20have%20upper%20limb%20loss>
- Pons, J. L., Rocon, E., Ceres, R., Reynaerts, D., Saro, B., Levin, S., & Moorlegheem, V. W. (2004, 1 marzo). *The MANUS-HAND Dextrous Robotics Upper Limb Prosthesis: Mechanical and Manipulation Aspects*. Autonomous Robots. https://link.springer.com/article/10.1023/B:AURO.0000016862.38337.f1?error=cookies_not_supported&code=61a3bb4f-29fd-471d-814b-247313770ad1

Consumer design priorities for upper limb prosthetics. (s. f.). Taylor & Francis.

<https://www.tandfonline.com/doi/abs/10.1080/17483100701714733>

Consumer design priorities for upper limb prosthetics. (s. f.). Taylor & Francis.

<https://www.tandfonline.com/doi/abs/10.1080/17483100701714733>

González, J. C. (2009, 1 julio). *SciELO - Saúde Pública - Cost-of-illness study of type 2 diabetes mellitus in Colombia Cost-of-illness study of type 2 diabetes mellitus in Colombia. Cost-of-illness study of type 2 diabetes mellitus in Colombia.*

<https://www.scielosp.org/article/rpsp/2009.v26n1/55-63/>

Castaño-González, A. (2017, 15 mayo). *Funcionamiento y estado de salud en una población de amputados de miembro inferior en Medellín, Colombia | Iatreia.* Universidad de Antioquia. <https://revistas.udea.edu.co/index.php/iatreia/article/view/325189>

El paciente amputado: complicaciones en su proceso de rehabilitación. (2020, 16 marzo).

URosario. <https://revistas.urosario.edu.co/index.php/revsalud/article/view/276>

<https://www.cdc.gov/ncbddd/spanish/birthdefects/ul-limbreductiondefects.html>

<https://www.amputee-coalition.org/resources/spanish-history-prosthetics/>

<https://www.nhs.uk/conditions/amputation/>

<https://www.gminsights.com/industry-analysis/upper-limb-prosthetics-market>

<https://fabrilab.com.co/nuestros-desarrollos.html>

8. Appendix

8.1. Open answers Why don't you wear a prosthesis?

Consideramos que no es algo esencial para el desarrollo de nuestro hijo. Entendemos que es una herramienta que el podrá elegir usar o no. Pero no consideramos que sea algo indispensable para su desarrollo personal.

Porque nací con este cuerpo y un cerebro para manejarlo así. Usar una prótesis implicaría un proceso de adaptación de mi cerebro que veo innecesario. Además que me manejo a la perfección sin ella no vería porque usarla

Se ha usado en ocasiones y no todo el tiempo , por crecimiento se le queda pequeña, y por la forma del muñón no tiene una fácil adaptación

En ppcas ocasiones use las hechas en 3d. Porque graciaa a Dios logro hacer todo sin complicaciones. Solo lo q uso por mas tiempo es el adaptador para tocar el violín ya q sin él seria comcomplicado por l posición del instrumento.

Siento que usarla solo dificulta las cosas dure mucho tiempo sin una y al final termine acostumbrándome a hacer las cosas básicas sin una.

Por que se siente mas independiente si ella a demas tiene una que la verdad no tiene movimiento de nada y pesa mucho

es incomodo

Por qué me he adaptado sin prótesis y se me facilitaron ciertas cosas

En Colombia no son desarrolladas y se vuelven más bien un obstáculo para desenvolvemos

La afectación de simbraquidactilia en mi caso La mano tiene toda la funcionalidad debido a que no hay mayor afectación del pulgar y el meñique. se puede hacer pinza con esos dos dedos

8.2. A brief opinion regarding the prosthesis

No me gustan las prótesis muy complicadas así que prefiero usar un tipo de gancho el cual me permite agarrar cosas con más facilidad pero se siente como si no usara nada.

La uso la mayoría del tiempo y logro hacer más cosas cuando la uso, aun que algunas veces se siente como algo molesto ya que se vuelve un encarte

Realmente por ser un niño es más lo que le incomoda que lo que le aporta, por que por su muñón se le saca o suelta muy fácilmente

uso prótesis solo por que me ayuda en algunas cosas pero prefiero no usarla. cuando la uso me termina doliendo un lado del cuerpo y en otras cosas tampoco es fácil de hacer cosas.

En realidad es parte de mis juguetes cuando tengo ganas de jugar la uso sino no. Ya que sin ella mi vida es más normal sin grandes complicaciones. Si bien es súper liviana la prótesis no deja de ser cansador manejarla x mucho tiempo.

Soy mamá de un niño que usa prótesis de miembros inferiores desde los 10 meses „es una parte de el „no puede estar sin ellas las pide y las elige siempre

Pues la verdad no la usa es un material que pesa mucho no tiene movimiento de nada

Uso muy poco la prótesis que tengo y prefiero no usarla me acostumbre a hacer mi vida sin una y cuando la uso siento todo más difícil de hacer y me hace sentir dolor en algunas partes

Que me ayuda con ciertas cosas pero puede ser pesada brusca o ineficiente por lo antes nombrado

E usando otras prótesis antes y debo decir que esta es la mejor que he tenido me causa menos molestia como los dolores en la espalda pero no puedo decir que se siente como un brazo normal y algunas veces no puedo manejar que hace.

Es bastante cómoda y me facilita hacer muchas cosas pero tampoco me permite ser muy preciso pero a pesar de eso me gusta

Me permite hacer actividades más complejas, y aun que fue difícil aprender como moverme para moverla, prefiero usarla a nada.

la prótesis me ha ayudado a hacer cosas que otros hacían y yo no me deja jugar y hacer cosas con los demás a veces me duele el hombro

Mi hijo no la usa x que dice es muy pesada y poco funcional

8.3. What material is your prosthesis made of?

Plástico pero tiene muchos cables y partes electricas también.

Plástico y metal

Filamento de plastico

plastico 3d

D pasta y metal

Metal y cuero

esta hecha en una impresora 3d

Plastico impresa en 3D

plastico

Hilos plasticos ya q esta impresa en 3d

Fibra de carbono,,más todos los elementos ortopédicos para conformar una prótesis de miembros inferiores

De yeso y caucho

8.4. Public Opinions

These links of social opinions through networks or forums were a support allowing the deepening of the experience, of the users with the types of prostheses, and an understanding of the answers that are in the previous annex and a support for the realization of the guide in figure 10.

- <https://d.docs.live.net/99ee04b4e50236fc/Documents/sJ/monograph/Monography%20table.xlsx>
- https://www.tiktok.com/@digitaltrends/video/6798573586907991301?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- https://www.tiktok.com/@desivila98/video/6824075726656900357?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- https://www.tiktok.com/@milypickles1/video/6901341575482182914?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- https://www.tiktok.com/@capnhook/video/6860478658801339654?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- https://www.tiktok.com/@capnhook/video/6789617693835136261?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- https://www.tiktok.com/@desivila98/video/6824920286891199749?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- https://www.tiktok.com/@tabbie_doll/video/6797996052491275525?lang=es&is_copy_url=0&is_from_webapp=v2&sender_device=pc&sender_web_id=6930584340481017350
- <https://www.amputee-coalition.org/resources/spanish-faqs-for-new-amputees/>
- <https://www.facebook.com/groups/34726968796/>
- <https://salud.asepeyo.es/profesionales/nuevo-articulo-sobre-la-utilidad-de-la-protesis-mioelectrica-de-antebrazo-en-pacientes-amputados-transradiales/>

- <https://www.manosydedos.com/precios.html#>
- <https://docs.google.com/forms/d/1RBXVNDUNy3122tjy8VcNLxfjVQ6STr3nj-Rj9gIr8/edit#responses>
- [Monography table.xlsx](#)



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