TRAUMATIC AMPUTATION OF THE THUMB: PHYSIOTHERAPY, RESILIENCE AND QUALITY OF LIFE

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Abstract
Background: The objective of this research was to measure the resilience and quality of life of a patient with traumatic amputation of the right thumb, whose recovery and physiotherapy process progressed at an accelerated pace, thanks to his psychological attitude during the process.

Methods: The study was carried out in two phases: 1) the collection of data from the patient and about the traumatic event, in which he suffered a traumatic amputation, by means of assessment scales, photographs, comparative videos showing the progress in the patient's daily life activities; 2) a psychometric evaluation of psychological variables related to the psychosocial adaptive possibilities of the subject.

Results: The main results show that the methodology used and carried out to evaluate this case and the progress of patient X, from the point of view of physiotherapy and psychology, was effective both in the pre-surgical phase and in the post-surgical phase.

Conclusion: In addition, the conclusions state that the patient's positive attitude, and psychological variables with high levels in World assumptions, psychological well-being, resilience and quality of life reflect a highly adaptive potential, which makes him an uncommon patient, in accordance with the statistics on psychological sequelae of amputations. The paper closes by emphasizing that the conclusions have a very important limitation related to the study of a single case, which in no way determines generalities about this population.

Keywords: Traumatic amputation of the thumb, physiotherapy, resilience, quality of life.

Introduction

Approximately 1.71 billion people have musculoskeletal conditions worldwide, which are the main contributors to disability, with low back pain being its leading cause in 160 countries. These conditions significantly limit mobility and dexterity, leading to early retirement from work, lower levels of well-being, and a reduced ability to participate in society (WHO, 2022). The International Classification of Functioning, Disability and Health, or ICF framework (WHO, 2001), includes various injuries to the wrist or hand that can be categorized as disabilities, including amputations resulting from trauma of different nature, which is the focus of this article.

The ICF Framework is a classification of health and health-related conditions, which includes a list of environmental factors, among which the functioning and disability of an individual are included because they may occur in different contexts. Thus, the ICF is the WHO framework for measuring health and disability at both the individual and population levels, a criterion that was officially approved by all 191 WHO member states at the 54th World Health Assembly on May 22, 2001 (resolution WHA 54.21) as an international standard for describing and measuring health and disability (WHO, 2001).

Upper limb trauma represents between 10% to 40% of emergency department visits in North America and Europe, which leads to significant temporary or permanent disability (Bitar Benítez et al., 2021). In the USA, 20,000 new cases of upper limb amputations are reported annually, of which 80% are distal to the wrist, mostly due to the presence of diabetes mellitus, vascular disease, physical trauma or injury, and bone or joint cancer. 94% of non-fatal occupational amputations involve the fingers, and this statistic is 3 to 6 times higher in men than in women, with a higher incidence of occurrence in people between 25 and 65 years of age (Sáez Oporto et al, 2019).

Similarly, in Latin American countries such as Colombia, Bitar Benítez et al. (2021) state that the most frequent trauma was to the hand and fingers (31%) caused by occupational accidents (33%). In Mexico, Osnaya-Moreno et al. (2014) indicate that the most injured hand was the right hand (46.7%), the most common mechanism of injury was by grinding (41%), followed by sharp objects (32.4%), and that the dominant hand was affected more often (50.47%). In Chile Méndez, M. (2010), emphasize that it is mainly young male manual workers who are subjected to serious hand injuries. Similarly, in a study at the Regional Hospital of Temuco, Sáez Oporto et al (2019) indicated that, out of the total of upper limb amputations occurring between 2004 and 2008, 85% were done to men, with an average age of 39, and 75% suffering amputation exclusively of a finger and the majority due to physical trauma such as crushing or injuries involving knives, saws and other kinds of injuries.

In the sixth statistical bulletin of occupational accidents and occupational diseases (Instituto Ecuatoriano de Seguridad Social, IESS, 2018, p.32), the Ecuadorian Institute of Social Security (IESS) points out that in Ecuador the economic activity that had the highest number of qualified work accidents was the Communal, Social and Personal Service with 25.6%, followed by Manufacturing Industries with 18.1% and Wholesale and Retail Trade, Restaurants and Hotels with 17.2%. In addition, the same source indicates that the part of the body that is most affected in work accidents is the upper limb with 36% of cases, with the greatest affectation being in the fingers of the left hand with 25.7% and fingers of the right hand with 23% (IESS, 2018). Five types of injuries are identified as the most representative, which are Superficial trauma (31.7%), Other injuries (20.1%), Fractures (18.6%), Sprains and strains (8.9%) and finally Contusions and crushes (8.3%); the remaining types of injuries represent less than 5.0%.

It should be emphasized that, despite the data presented, neither the statistical bulletin of occupational accidents and occupational diseases (IESS, 2018), nor the national registry of disabilities (Consejo nacional para la igualdad de discapacidades del Ecuador, CONADIS, 2024), nor the qualification data for persons with disabilities (Ministerio de Salud Pública del Ecuador, MSP, 2015), include a separate set of statistics for amputations in general and particularly upper limb amputations, therefore, it is difficult to determine what are the real figures in Ecuador in the context of this study.

Hand amputation and disability

A disability is defined as any restriction or absence of the ability to perform an activity in the manner, or within the range considered normal for a human being, as a consequence of impairment. In some standard classifications, upper limb amputation is attributed to the group of motor disabilities, which include other impairments and disabilities, such as those for walking, manipulating objects and coordinating movements, as well as for using arms and hands, which may even require the help of another person or some instrument (e.g. wheelchair, walker, or prosthesis) to perform activities of daily living (Instituto Nacional de Estadística Geografía e Informática de México, INEGI, n.d.). In another category from the same source,

upper limb disabilities include people who have limitations to use their arms and hands due to the total or partial loss of them, and even people who still have their upper limbs (arms and hands) but have lost the possibility of movement (e.g., grasping objects, opening and closing doors and windows, pushing, pulling or tugging with their arms and hands).

A history of traumatic amputation can generate disability of various kinds, so effective and prompt initial treatment is considered essential. When a body part is amputated, complications often occur, some of the most important being hemorrhage, shock and infection (MedlinePlus, 2022). If an accident or injury results in a complete amputation (i.e. the body part is completely severed), the body part can sometimes be reattached, especially when proper care is taken with the severed part, and residual limb or stump. In a partial amputation, part of the soft tissue connection remains, depending on the severity of the injury, the partially severed limb may or may not be reconnected.

Due to the aforementioned, certain impairments are common in these cases (Ten Kate, Smit & Breedveld, 2017):

- Loss of grip and gripper strength.
- Decreased independence in activities of daily living (ADL).
- Psychological alterations (independent of the degree of injury, i.e., an injury to the distal phalanx of the 5th finger may have worse psychological consequences than the loss of a complete limb in different individuals, which would depend on factors related to each individual patient).
- More than 50% of patients do not return to their previous work activity, either due to the impossibility of performing the same role, psychological alterations derived from the accident, among other causes.
- Most patients with traumatic loss of fingers in an occupational context present multiple finger amputation.
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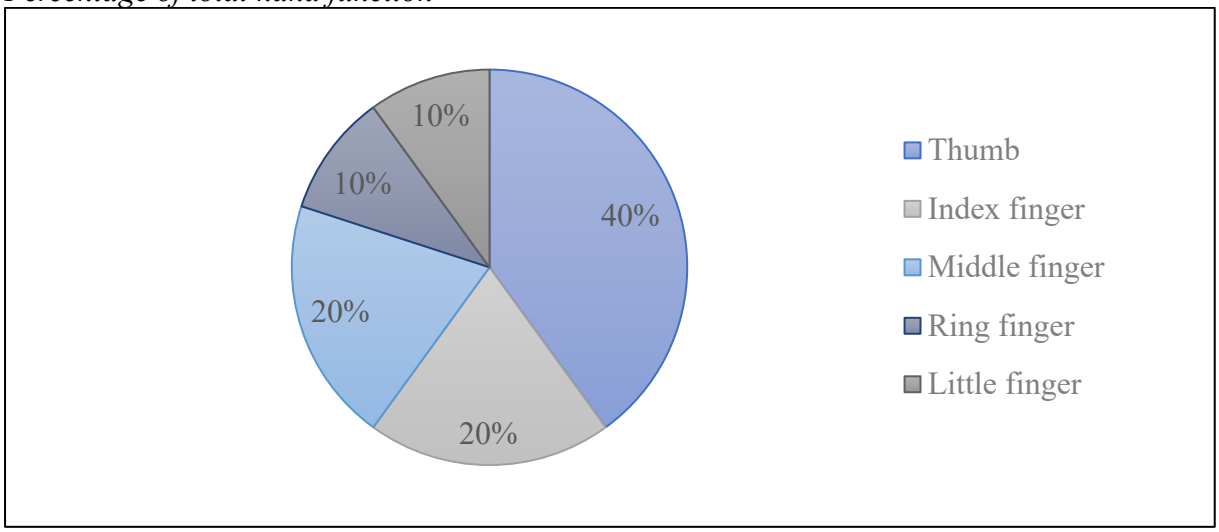
Figure 1.

Percentage of total hand function



Note: Adapted from Valbuena Moya, 2004.

Partial hand amputations (PHA) can affect various anatomical structures of this body segment, and the alteration of hand function impacts the performance of daily activities, since hands play a unique and very important role in a person's life and have a myriad of proprioceptive as well

as communicative functions (Turner, Foster, and Johnson, 2003). These injuries, which can be caused by different conditions and events, are classified according to the musculoskeletal structure or joint involved, from distal to proximal in relation to the human body. Based on this classification, injuries can be described as: interphalangeal joint, transmetacarpal, transcarpal, at the ray level (including the respective phalanges and metacarpal) and the thumb; all of these, in turn, being able to be of one or more fingers, at the same level or at a different one (Valbuena Moya, 2004), and involving a different affectation depending on the functionality of the fingers involved (see figure 1). The medium- and long-term results of a person who has suffered an amputation depend on the timely management of the emergency and critical care. An adequate and functional prosthesis and retraining can accelerate rehabilitation (MedlinePlus, 2022).

Personalized assessment and treatment

For a more adequate evaluation of the aftereffects of hand amputation, there are questionnaires that assess Health-Related Quality of Life (HRQOL) globally for the entire upper limb, as well as specific questionnaires for different anatomical areas (such as the shoulder, elbow and wrist), or specific pathologies. Within this type of questionnaires, the specific Carpal Tunnel Syndrome questionnaire (CTS Instrument) developed by the Brigham and Women's Hospital, the Boston Carpal Tunnel Instrument and the PRWE (patient-rated wrist evaluation) are some that stand out. That said, the most widely used questionnaire for the global assessment of the upper extremity is the Disabilities of the Arm, Shoulder and Hand or DASH questionnaire, developed jointly by the Institute for Work and Health and the American Academy of Orthopedic Surgeons (AAOS), and validated in Spanish by various authors and studies (Michel Rollock, 2015).

According to Méndez (2010), some of the reasons for performing the intervention in the shortest time possible, in cases of upper limb amputations, have to do with the fact that any delay in closing the wounds means a higher risk of edema and infection, and in the hand in particular, the installation of joint stiffness. Due to this, the author includes certain key moments in the treatment once the primary reconstruction process has been completed:

I. Initiate hand mobilization as soon as possible, so assessment and proper pain management is paramount (even considering the use of continuous regional analgesic if deemed necessary).
II. The efforts made in the reconstruction of the hand are aimed at initiating early rehabilitation, which requires a physiatrist and a support team that may include experts in kinesiology, occupational therapy and mental health.
III. The patient should start mobilizing the following day, and the positioning ostheses are placed after 48 hours.
IV. The rehabilitation plan should be followed closely by the surgeon to evaluate any complications and indicate modifications to the program.
V. The treatment period may last about 5-6 months, under normal conditions, before work activities can resume.

Psychological factors

Amputation is a disturbing event which leaves physical and emotional ramifications, where the individual requires both internal and external resources to resist, cope and get out of it. The family plays an important role as well, since this event, being one of the most disturbing events in the life of a human being due to a mismatch to their own person and their environment, generates a crisis, and the family system has to mobilize and reorganize its dynamics to achieve a functional adaptation (Gonzalez Reza, et al., 2017). Psychosocial maladjustment in these cases occurs due to an initial (and sometimes long-term) loss of autonomy, well-structured

body image and personal identity, so the subject is forced to make use of internal and external resources to cope with this situation.

The few studies that address the effects of amputation refer to large limbs and show that, beyond the physical sequelae, there are important consequences at the psychological level. Studies such as that of Nevado, Arteaga and Fernández-Montalvo (2024), have focused mainly on anxious and depressive symptomatology, post-traumatic stress disorder and phantom limb pain. These authors have also identified modulating variables that improve the prognosis of adaptation to daily life, such as physical exercise, coping strategies, resilience and quality of life. Following this, they conclude that the different psychological areas affected, mentioned above, should be considered when accompanying amputees (Nevado, Arteaga and Fernández-Montalvo 2024). Díaz Agea, Leal Costa and Gómez Díaz (2013), mention that suffering for amputees may be defined in different ways, but variables such as coping style determine whether there is greater or lesser suffering in amputation, resilience allows coping with and overcoming problems, and psychotherapy should focus on preventing and treating the aspects that influence this process.

In the literature published and available in Spanish, studies focusing on the psychological factors and the protection and risk variables related to hand amputation specifically are even fewer than for amputations in general. Yet, some studies do conclude that reactions and readjustment to life after an amputation is associated, in more than half of the cases, with symptoms such as depression, anxiety, post-traumatic stress, loss of sense of belonging, social isolation, decrease in sexual activity and deterioration in the perceived quality of life, which means that, in general, the tendency of people to develop some type of mental health problem after this event increases (Sahu et al., 2016; Font-Jimenez et al., 2016, Jímenez García, 2017; González Reza, et al., 2017; Bergo and Prebianchi, 2018; and, Mesquita Dummar, 2021).

Among the variables that various authors point out, which can differentiate the emotional impact experienced after amputation are: (a) the etiology of the amputation; (b) the location or organ amputated; (c) the presence or absence of phantom pain (often only equivocally addressed from a physical standpoint, without the psychological aspect not being taken into account despite being present in between 50-80% of the population and being able to persist for years); (d) the changes in body image perception; (e) the quality of family, social and economic support; f) social and self-stigmatization; g) the restriction of activity and changes in the work environment; h) the level of adjustment of the prosthesis, as well as, i) the normal mourning process when facing the loss of a limb (whether upper or lower), which influence the dynamics of adaptation, factors necessary to take into account when working with these cases (Mesquita Dummar, 2021; González Reza, et al. , 2017). Other data reported indicate that the length of the initial hospital stay, the number of hospitalizations and follow-ups per year, the social circle of support and help, the perception of pain, optimism and satisfaction with rehabilitation are factors that influence the emotional state of patients in this population (Bhutani et al., 2016).

In view of the above, several authors promote the idea that multidisciplinary treatment should contemplate the prevention of problems of adaptation and coping with the new reality of these people and would require psychological evaluation as part of the protocol for the care of amputees. As an example, Patiño Martínez et al. (2020) mention that, if the individual has sufficient protective factors, he will adapt to the difficulty without experiencing a significant rupture in his life, which will allow him to remain in balance or move towards a more resilient

adaptation due to the emotional strength and healthy coping strategies developed in the process of overcoming adversity.

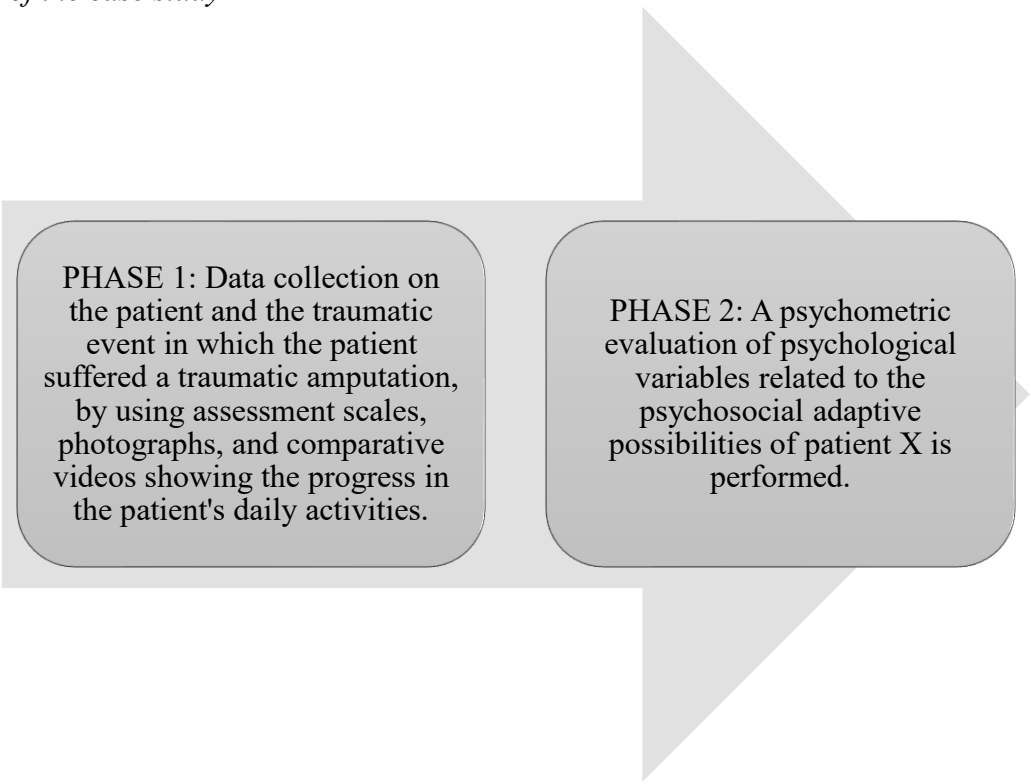
In order to implement a rehabilitation care protocol for a patient with a traumatic partial hand amputation, a transdisciplinary approach is necessary, and it should include the psychological evaluation of the patient's adaptability characteristics in the face of the event. The objective of our study is to emphasize the importance of this aspect, through the analysis of a clinical case that exposes the psychological characteristics (World assumptions, psychological well-being, resilience and quality of life) of a patient who has achieved excellent progress in his rehabilitation process, showing the importance of the psychological aspect in the success of re-adaptation in patients of this population.

Methodology

This research project was conducted under the guidelines of the Nuremberg Code of Ethics and it also adheres to the Code of Ethics of the Ministry of Public Health of Ecuador. The participant received a spoken briefing about the study. In addition, he signed a written declaration of participation, in which they expressed his voluntary consent to participate in the study. The present case is carried out in two study phases (see Figure 2).

Figure 2.

Phases of the case study



Phase 1: Physical evaluation

Perez Mármol (2020), proposes some tools for the assessment of hand functionality, among which he mentions the Quick DASH questionnaire for global functional assessment, the dynamometer and its variants for grip and hand gripper muscle strength, the goniometer for range of motion or joint amplitude, and for the evaluation of sensory function, he mentions that it is usually limited to light touch and the sensation of pain or nociception. Therefore, in the evaluation of this case, those are the chosen tools.

1. Quick DASH

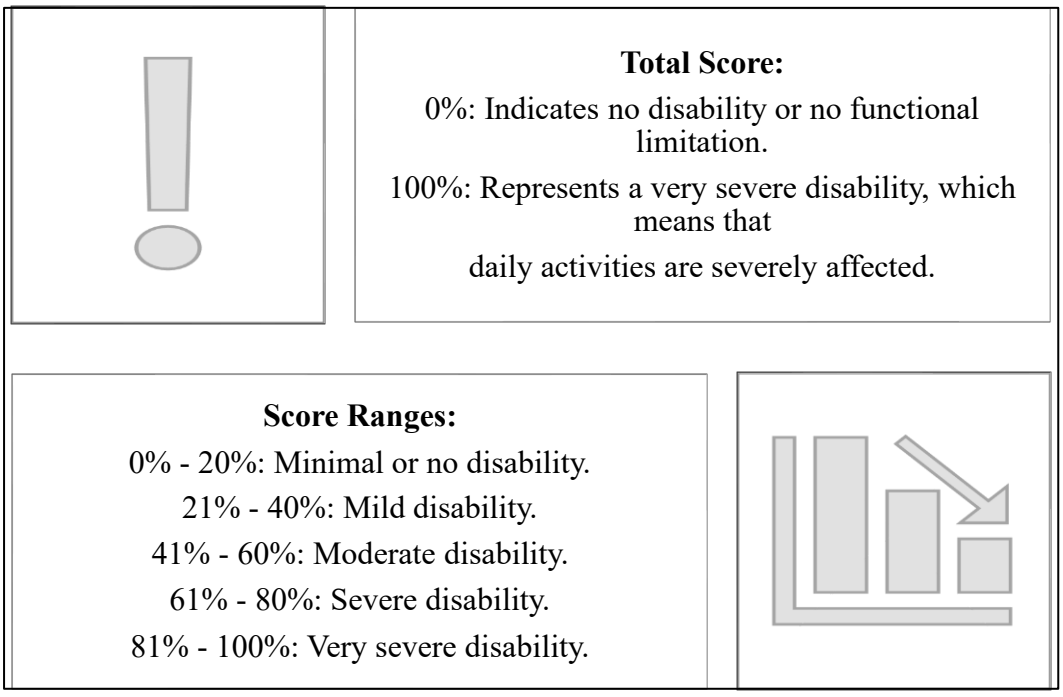
The DASH questionnaire assesses the upper limb as a functional unit, allowing quantification and comparison of the impact of the different pathologies that affect it. The instrument is a self-administered questionnaire with 5-point Likert-type questions consisting of two parts, one mandatory and one optional. The mandatory module is called disability/symptoms, and the optional module consists of two modules which include sports/music or work. The DASH is scored considering two components: the first one encompassing the disability/symptoms questions, consisting of 30 items, scored from 1 to 5, and the second one integrated by the optional section of the work module or the special activities module sports/music with 4 items each scored from 1 to 5 (Michel Rollock, 2015; Turner, Foster, & Johnson, 2003).

García González et al. (2018), obtained satisfactory values of ability to detect response to change and validity, performing tests to demonstrate the comparable behavior between the Quick DASH and the DASH already validated in Spanish; the abbreviated version of the scale lost precision both transversely and longitudinally due to the decrease in internal consistency and stability in the sample studied, however it retained the ability to discriminate and detect change, results that allow recommending its use in clinical and research environment. Similarly, Chamorro et al (2020) conclude that the psychometric properties in their research demonstrate that the Quick DASH can be used reliably in both clinical and research settings for Chilean patients with shoulder pathologies.

The Quick DASH consists of 11 items (originally there were 30 on the DASH scale), which assess the ability to perform various activities during the previous week before the test, and also rates the severity of symptoms. The responses to each item are scored on a scale of 0 to 5 points and the total score is calculated by adding the values assigned to each completed response and then finding the average, thus obtaining a score from one to five. To express this score in hundreds, we subtract 1 and multiply by 25, a value that will range from 0% (no disability) to 100% (severe disability).

Figure 3.

Quick Dash scoring and scoring range



Note. Adapted from Orthotoolkit, 2024.

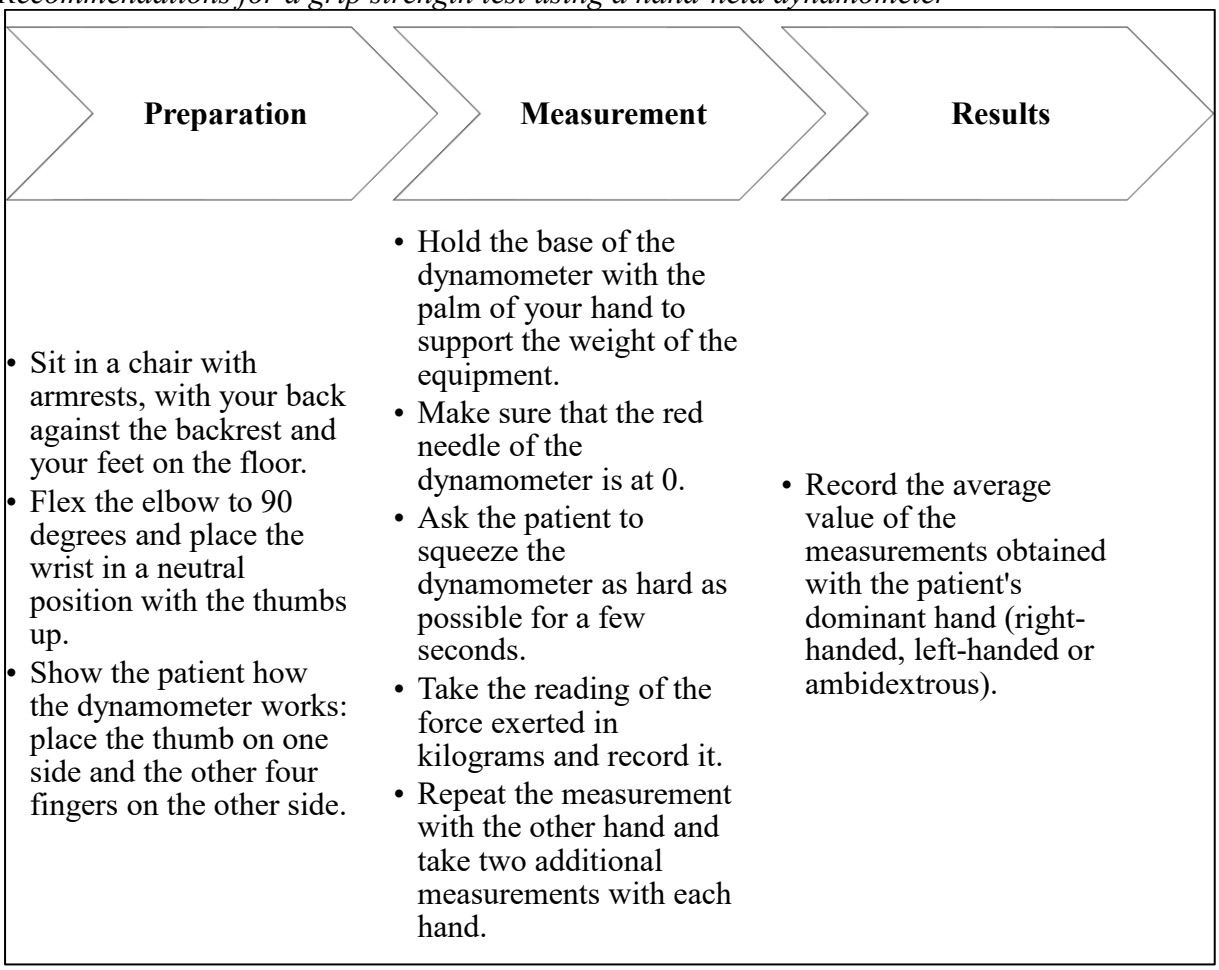
Therefore, for our study we chose to use the validated Spanish version of the Quick DASH abbreviated upper limb function scale (Rosales, 2006) and the scoring scales and ranges presented in Figure 3 (Orthotoolkit, 2024).

2. Dynamometry

The hand dynamometer is a device used to measure a person's grip strength, it assesses muscle strength in the hand and forearm (Norman et al, 2011).

Figure 4.

Recommendations for a grip strength test using a hand-held dynamometer



Note. Adapted from Schaap et al, 2016.

3. Goniometric assessment

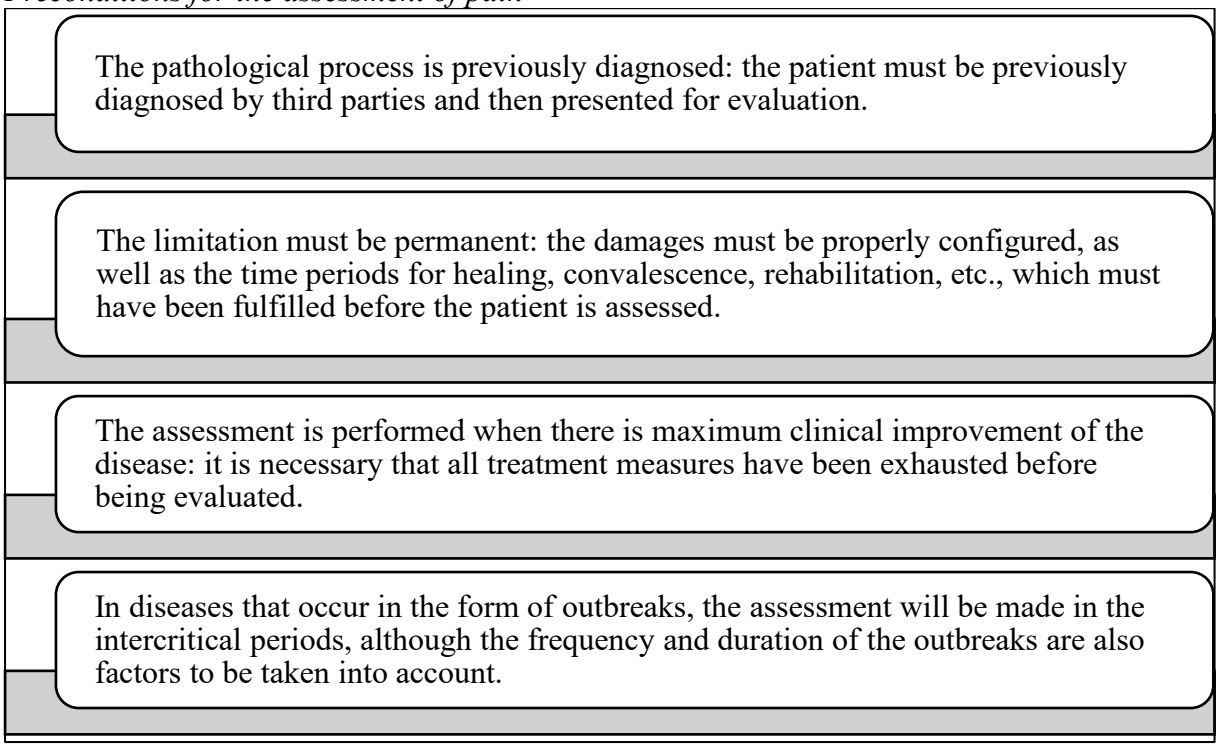
Goniometry has been used by human civilization from ancient times to our time in countless applications, such as agriculture, carpentry, blacksmithing, mathematics, geometry, physics, engineering and architecture, among others. It is the technique of measuring the angles created by the intersection of the longitudinal axes of the bones at the level of the joints and can pursue two objectives (Taboadela, 2007): a) to evaluate the position of a joint in space (in this case, it is a static procedure used to objectify and quantify the absence of mobility of a joint); and b) to evaluate the arc of motion of a joint in each of the three planes of space (in this case, it is a dynamic procedure used to objectify and quantify the mobility of a joint).

4. Assessment of pain

Pain is defined as an unpleasant sensory or emotional experience associated with actual or potential tissue damage. It is in any case a subjective concept and exists whenever a patient says that something hurts. The main conditions necessary in the assessment of pain include those shown in Figure 5.

Figure 5.

Preconditions for the assessment of pain



Note. Adapted from Vicente Herrero et al, 2018.

For this research the numerical rating scale (NR) is used, numbered from 1-10, where 0 - is the absence of pain and 10 - is the greatest intensity of pain. With this, the patient selects the number that best evaluates the intensity of the symptom. It is the simplest and most commonly used scale (Vicente Herrero et al, 2018).

Phase 2: Psychological evaluation

The instruments used to measure basic beliefs, psychological well-being, resilience and patient-perceived quality of life are presented below.

1. World assumptions - Janoff-Bulman test

The theory developed by Janoff-Bulman (1992), seeks to explain that people need and develop basic conceptual schemes that allow them to efficiently face the reality of fundamental beliefs and/or assumptions, postulating how these are composed, the types of events that could change them, and why these changes would occur. Her clinical experience with victims of traumatic events led her to understand that this set of core beliefs is a set of stable cognitive representations about the world, others and ourselves, allowing us to orient ourselves in reality with certain expectations that give a sense of order and control over life.

Figure 6.
Set of essential world assumptions according to Janoff-Bulman

	GOOD (evaluative)	**MEANINGFUL (cognitive)**	**EFFECTIVE (instrumental)**
THE WORLD The belief that there is more good in the world than evil:	The world is good. The world is a nice place. In the world there is more good than bad. The world is beautiful.	The world has meaning. Life is worth living. The world is fair. In life you reap what you sow.	The world runs like clockwork. Evolution moves towards a goal. Nature is wise.
THE SOCIAL WORLD The belief that the world has meaning and reason for being the way it is, that events occur for concrete reasons, and are controlled by justice:	Man is good by nature. In man there are more things to admire than to despise. Society is Good.	Social life has a meaning. Others behave with you as you behave with them. History does justice.	Society fulfills its function well. Society advances and improves. History reflects the progress of mankind.
THE SELF Belief in the value of "I":	I consider myself a good person. I am satisfied with myself.	My life is full of meaning. I am a person with principles. I am a lucky person.	I am confident in my own ability. I know how to achieve what I set out to do.

Note. Adapted from D. Páez, M. A. Bilbao y F. Javaloy, 2008, p. 9.

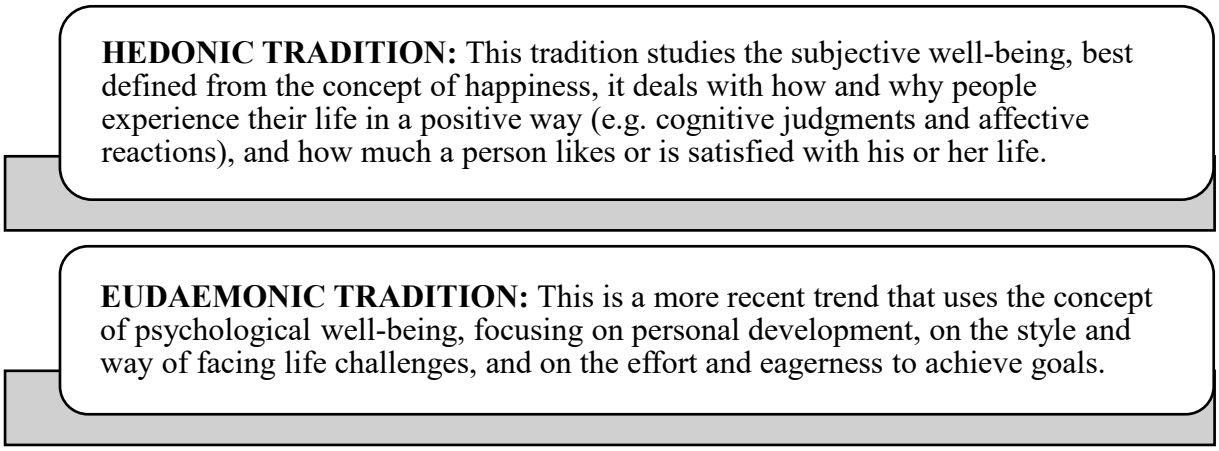
The author postulated the existence of a set of benevolent or positive core beliefs that people have about the world (that it is fair, controllable, meaningful), about oneself (competent and worthy of respect) and about others (that we can trust them) (Janoff-Bulman, 1992), which were grouped into three major categories: benevolence of the world, the meaningful nature of events, and the worthiness of the self (Martínez, et a., 2011). Within these three categories, there are eight subscales used for measurement. So, benevolence of the world and benevolence of the people are the two subscales within the first category, and they measure the perception of kindness surrounding the respondent. The subscales related to meaningfulness measure the perception of whether bad events occur at random (randomness), are distributed by a system of principles related to justice (justice), or that they are controlled by other people's behaviors (controllability). Finally, in the case of the category for Worthiness of the self, the subscales include self-worth, self-control and luck. The measurement for these indicates how much the respondent values themselves, how their own actions control their experience of the world and how positively they perceive their luck (van Bruggen et al. 2018).

These beliefs are implicit, rooted in emotional experience and strongly held despite adversity and evidence to the contrary. Work on core beliefs has posited that daily experiences that could undermine them are generally not sufficiently impactful to cause lasting changes in them (Bilbao, Paez, da Costa, & Martinez-Zelaya, 2013).

2. Psychological well-being - RYFF scales

Figure 7.

Lines in which the concept of psychological well-being has been approached



Note. Adapted from Muratori, Delfino, Mele y Fernández, 2010.

Muratori, Delfino, Mele and Fernandez (2010), point out several factors related to psychological well-being: (a) even people with greater happiness or satisfaction with their life have worries and experience negative emotions; (b) although more than 70% are very satisfied with their life, epidemiological studies show that at the same time, 80% of the normal population presents some anxious, depressive or somatic symptom; (c) traumatic events are more frequent throughout life nowadays (60% of people have experienced some extreme negative event); d) of people who have experienced a traumatic event in the last year, only 20-30% develop a major disorder; e) the effect on well-being of extreme events is not the same, negative events have a greater and more lasting impact on people than positive events, despite the fact that the latter are more frequent; f) the effect on well-being of extreme events is not the same, negative events have a greater and more lasting impact on people than positive events, even though the latter are more frequent.

Table 1.

Variables of the RYFF scales and their respective interpretations

Self-acceptance	
(+) It is positive for oneself and one's past; one is aware of and accepts its different sides, including positive and negative qualities.	(–) Dissatisfied with oneself; disappointed with one's past; worried about certain personality traits; willing not to be who he/she is.
Positive relationships with others	
(+) Gains satisfaction from a warm, trusting relationship with others; is concerned about the well-being of others; is capable of strong empathy, affection, and intimacy; understands the need to compromise in relationships.	(–) Lacks close and trusting relationships with others; finds it difficult to care for others, be warm and open; isolated and frustrated in interpersonal relationships; does not tend to engage in maintaining important connections with others.
Autonomy	

(+) Self-determination and independence; able to resist social pressure, think and behave independently; self-regulates behavior; evaluates self based on personal standards.	(–) One is concerned with the expectations and evaluations of others; in making important decisions relies on the judgments of others; his thinking and behavior is subject to social pressures.
Environmental mastery	
(+) One possesses a sense of skill and competence in mastering the environment; performs a variety of activities; is able to choose or create an appropriate context for the realization of personal needs and values.	(–) Difficult to cope with day-to-day issues; feels unable to improve or change surrounding circumstances; unaware of opportunities offered by the environment; lacks a sense of control over the outside world.
Personal growth	
(+) One has a sense of continuous development and realization of potential; sees growth and expansion; is open to new experiences; sees increasing improvement in self and behavior over time; changes reflect increased self-awareness and efficiency.	(–) Feelings of personal stagnation; lack of a sense of improvement and expansion over time; feeling bored and disinterested in life; feeling unable to acquire new attitudes and modes of behavior.
Purpose in life	
(+) One has goals in life and a sense of directionality; a sense of meaning of past and present; has beliefs that give life purpose; has motives and reasons for living.	(–) No sense of meaning in life; lack of goals, sense of direction; no sense of purpose in your past; no opinions and beliefs that give meaning to life.

Note. Adapted from Díaz, Rodríguez-Carvajal, Blanco, Moreno-Jiménez, Gallardo, Valle, y Dierendonck, 2006.

3. Resilience - Wagnild & Young Scale

It is important to note that resilience as a concept has changed the way we perceive the human being, moving from a model focused on risks, trauma and the psychopathology of living, to a prevention model based on the potential and resources that the human being possesses in relation to his environment. This concept has been defined by many authors, with some coinciding on the idea that it represents a certain capacity or possibility of transformation to overcome adversity through adaptation. Another definition that could generalize resilience describes it as a continuous learning process that some people have as a result of interaction with the environment, depending on the diverse combination of factors that enable a person to face, overcome and develop in a better way after negative, adverse or traumatic events (Quiñones Rodríguez, 2006).

In the 1990s, Wagnild & Young constructed a Resilience Scale with the purpose of identifying the degree of this individual characteristic, considered as a dimension of positive personality that allows the adaptation of the individual to adverse situations (Gómez Chacaltana, 2019).

The authors established sub variables related to resilience that are grouped into two factors (see Table 2).

Table 2.

Variables of the Wagnild & Young Scale

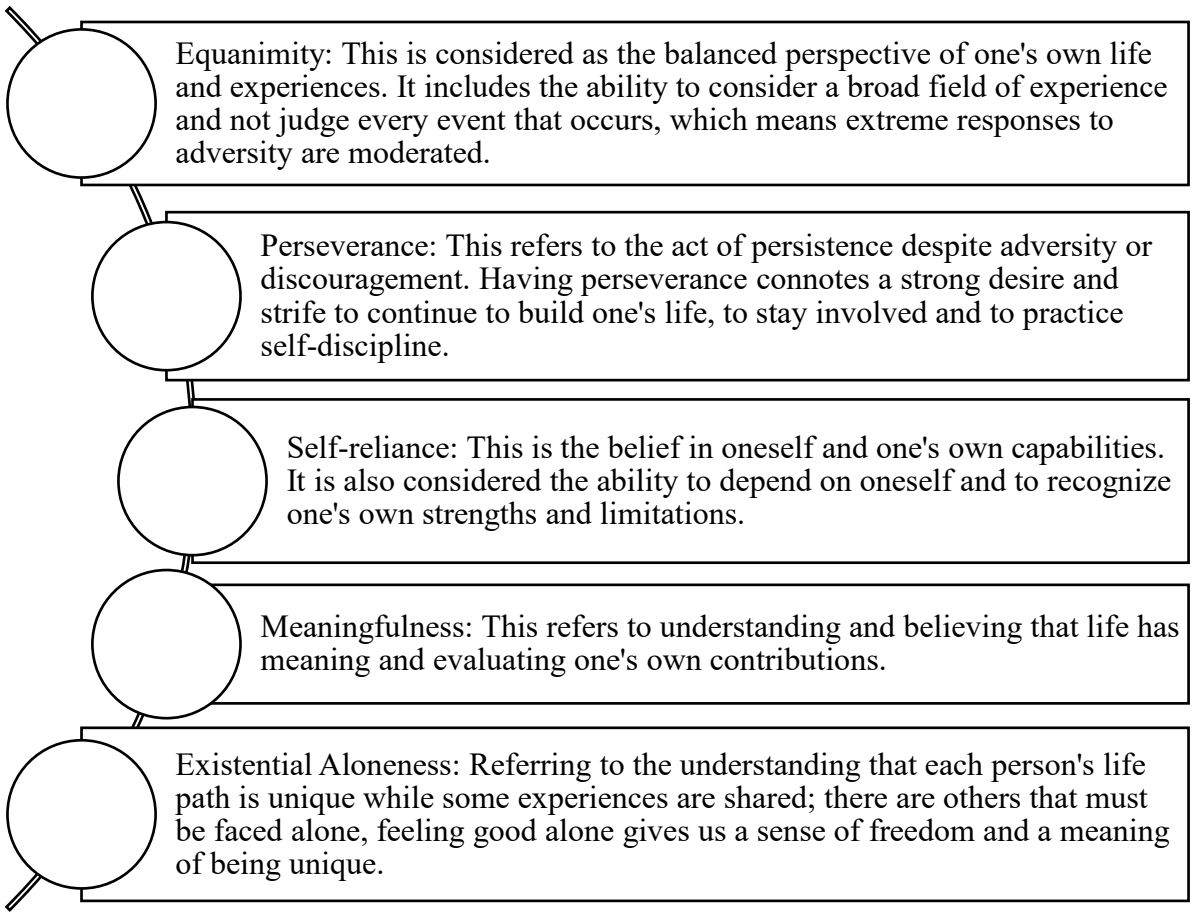
	Factor I: Personal Competence	**Factor II: Acceptance of Self and Life**

EQUANIMITY	8, 11	7, 12
PERSEVERANCE	1, 4, 14,15, 23	2, 20
SELF-RELIANCE	6,9, 10, 17, 24	13, 18
MEANINGFULNESS	16, 21, 25	22
EXISTENTIAL ALONENESS	3, 5	19

Note: Adapted from M.A. Gómez Chacaltana, 2019, p. 86; Abiola & Udofia, 2011.

Figure 8.

Variables of the Wagnild & & Young Scale



Note. Adapted from Gómez Chacaltana, 2019, Abiola & Udofia, 2011.

4. Quality of Life - WHOQOL-BREF

The objective of the WHOQOL in general, focuses on the quality of life perceived by the person, providing a profile of the same and giving an overall score of the areas and facets that compose it. It is applied to the general population and to patients with a reference time of 2 weeks, and each person must complete the questionnaire by him/herself. In the case of the taker not being able to fill it out themselves, (not knowing how to write or read) he/she can be interviewed (Badia and Alonso, 2007; and, Freire de Oliveira et al, 2008).

Table 3.
Areas and facets of the WHOQOL-100

Areas	**Facets incorporated into the areas**
	Overall quality of life and general health
PHYSICAL HEALTH	• Energy and fatigue • Pain and discomfort • Sleep and rest
PSYCHOLOGY	• Body image and appearance • Negative feelings • Positive feelings • Self-esteem • Thinking, learning, memory and concentration
LEVEL OF INDEPENDENCE	• Mobility • Activities of daily living • Dependence on medications and medical aids • Ability to work
SOCIAL RELATIONSHIPS	• Personal relationships • Social support • Sexual activity
ENVIRONMENT	• Economic resources • Freedom and physical security • Health and social system: accessibility and quality • Home environment • Opportunities to acquire new information and skills • Participation in and opportunities for recreation/leisure • Physical environment (pollution/noise/traffic/climate) • Transportation
RELIGION / SPIRITUALITY / PERSONAL BELIEFS	• Religion/Spirituality/Personal Beliefs

Note. Taken from WHO, 1997.

Several statistical analyses performed on the structure of the WHOQOL-100 facilitated joining areas 1 with 3 and 2 with 6, giving rise to a new version with only 4 areas of quality of life, a version that is currently used in various field works related to the measurement of this variable (WHO, 1997). The WHOQOL-BREF contains 26 questions: 2 of them, are global about quality of life and general health, and the other 24 generate a profile of quality of life in 4 dimensions that include 1) Physical Health; 2) Psychological Health; 3) Social Relationships; and 4) Environment (Sanabria Hernández, 2017).

This questionnaire assesses the relevant dimensions of quality of life in different cultures. It is only as long as a fourth part of the WHOQOL-100 and provides an alternative to assess the WHOQOL-100 area profiles more quickly, although individual facets of the areas are not assessed. Its use has been focused on large-scale studies, audits and clinical practice, areas in which the long version of the questionnaire is not adequate. In addition, it has been translated

into 19 languages, and is applicable to both healthy and ill subjects. Each item is scored on a 5-point Likert scale (1 to 5). The scores for items 3, 4 and 26 must be reversed. A patient profile and a score on perception of global quality of life and general health are obtained. There are no proposed cut-off points. The higher the score, the higher the perceived quality of life (WHO, 1997; Badia and Alonso, 2007; and, Freire de Oliveira et al, 2008).

The WHOQOL-BREF is one of the instruments which is most recommended among the ones used to address health-related quality of life. Cardona-Arias and Higuita-Gutiérrez (2014), recommend it, due to its excellent conceptual and psychometric properties and possibilities of use, both for measuring the impact of an intervention and detecting changes in health status, and for facilitating communication between the patient and the physician. This instrument provides information on therapeutic adherence and can help in guiding decision making.

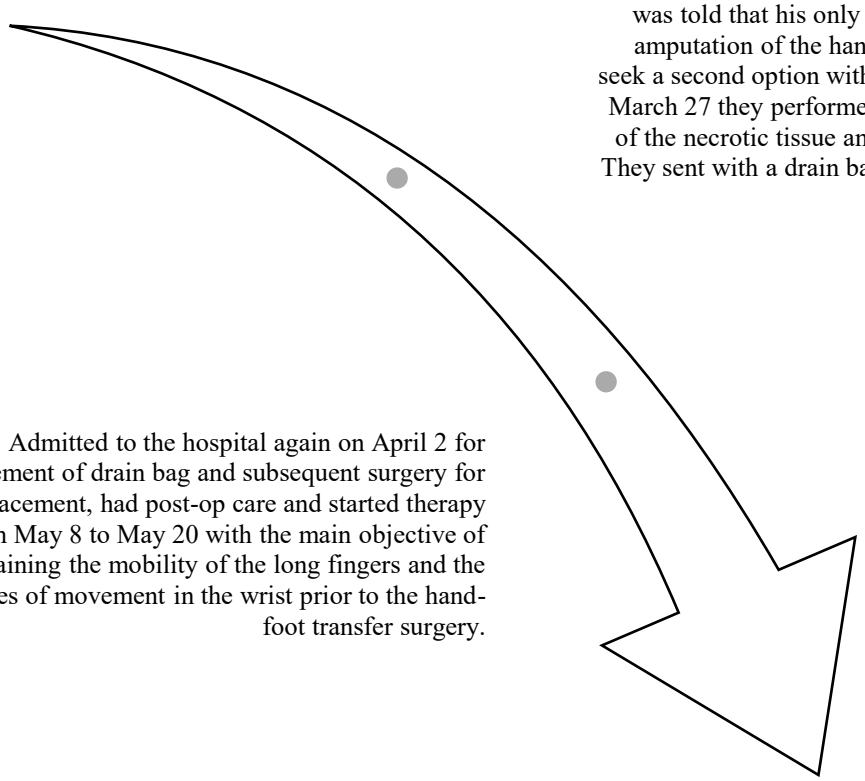
Results

Figure 9.

Clinical History and Anamnesis

Patient X, male, single, with an undergraduate degree, 29 years old, without pathological or surgical antecedents, with prescribed medication: Anapsique half a pill every other day 25 mg; was treated at the Orthopedic Specialties Center in the city of Quito - Ecuador in the period between May and September of 2023, in which different techniques and exercises were used with the purpose of recovering the greatest possible functionality of the patient. The following is evidence of the advances obtained with the treatment.

Patient refers that on March 17 he suffered an accident in an industrial mill that caused a partial tearing of the thumb, so he was taken to the emergency room where he underwent the first surgery for reimplantation with nail placement that did not progress favorably. He was told that his only option was complete amputation of the hand, so they decided to seek a second option with a hand surgeon. On March 27 they performed a surgical cleaning of the necrotic tissue and a thumb tenodesis. They sent with a drain bag from April 27th to April 2nd.



Admitted to the hospital again on April 2 for replacement of drain bag and subsequent surgery for graft placement, had post-op care and started therapy from May 8 to May 20 with the main objective of maintaining the mobility of the long fingers and the arches of movement in the wrist prior to the hand-foot transfer surgery.

On May 23 they performed surgery for transfer of the second toe of the right foot, which did not survive due to vascular damage, he remained hospitalized until May 26. After that, another surgery was performed on June 1st for traumatic amputation of the thumb and placement of a BAG, with which he remained for 10 days. The last surgery was performed on June 14 for graft placement. He resumed therapy from July 10 to September 20 for a total of 40 sessions.

International Classification of Functioning, Disability and Health (ICF)
ICD-11 for Mortality and Morbidity Statistics
NC59 Traumatic amputation of wrist or hand.
XK9K Right.
XA8DJ6 Thumb

Phase 1: Physical assessment
First pre-surgical assessment (May 8, 2023)
The patient presents with pain 8/10 NR in the right hand, phantom limb pain 2/10 NR in the right hand. Wound and scars in inflammatory phase, looking in good condition, Coban bandage is maintained. There is hypersensitivity in residual limb. No strength tests are performed.

Table 4.
Goniometric assessment of wrist

Movement	Normal Range	Range of the Patient
FLEXION	50° to 60°	20°
EXTENSION	35° to 60°	15°
RADIAL DEVIATION	0 – 25°/30°	20°
ULNAR DEVIATION	0 – 30°/40°	10°

Table 5.
Goniometric assessment of fingers

Movement	Normal Range	Range of the Patient
MCP FLEXION	0 to 90°	30°
MCP EXTENSION	0 to 30°	20°
PIP FLEXION	0 to 100°	90°
DIP FLEXION	0 to 90°	85°

Second post-surgical assessment (July 10, 2023)
Patient presents with pain 3/10 NR in the right hand. Phantom limb pain at 1/10 NR. Wound and scars in proliferative phase, in good condition. Wrist in good condition, dry wound without sutures. Patient applies Rifocina spray every day as directed by the physician. No strength tests are performed.

Table 6.
Goniometric assessment wrist

Movement	Normal Range	Range of the Patient
FLEXION	50° to 60°	40°
EXTENSION	35° to 60°	30°
RADIAL DEVIATION	0 – 25°/30°	25°
ULNAR DEVIATION	0 – 30°/40°	30°

Table 7.
Goniometric assessment fingers

Movement	Normal Range	Range of the Patient
MCP FLEXION	0 to 90°	60°
MCP EXTENSION	0 to 30°	25°
PIP FLEXION	0 to 100°	90°
DIP FLEXION	0 to 90°	90°

Treatment plan

Forty sessions of hand and upper limb therapy were prescribed and completed. The first 20 sessions were carried out from Monday to Friday, one hour per day. The second group of 10 sessions was performed 3 times a week for 1 hour each day and the third group of 10 sessions was performed twice a week for 1 hour each day (see table 8, 9 and figure 10).

Table 8.

Materials used in treatment

Stackable figures	Cylindrical sockets	Bars without weight
Canadian pegboard	Sponges	Frisbee
Cognitive connection games	Mirror	1kg. and 2kg. bars
Screws	Sliding discs	TheraPutty
Nestable figures	Proprioception discs	TheraBand
Therapeutic balls of 0,5 kg. - 1kg. - 1,5kg. - 2kg and 2,5 kg.	Blaze Pod	Grains
Puzzles	Cubes, Cones	Finger bands
Large tweezers	Small clamps	Elastics and ropes

Note. Adapted from Banda Rabah, 2017; Basson, et al, 2017; Basson et al, 2015; Instituto Mexicano del seguro social, 2015.

Table 9.

Weekly treatment plan

1ST-2ND PRE-SURGICAL WEEK	PAIN MANAGEMENT	HEAT PACKS	COLD PACKS	LASER	SCAR MANAGEMENT	MIRROR THERAPY	PASSIVE MOBILITY OF WRIST AND LONG FINGERS	ACTIVE MOBILITY OF WRIST AND FINGERS	EDEMA CONTROL	MAPS THERAPY WITH CANADIAN PEGBOARD	TRAPEZIO-METACARPAL JOINT MOBILITY
1ST WEEK POST-OP	Laser	magnetotherapy	lymphatic drainage	scar management	analytical mobility on Canadian pegboard	tendon slippage					
2ND WEEK POST-OP	laser	magnetotherapy	lymphatic drainage	scar management	analytical mobility on Canadian pegboard	mirror therapy	muscle stretching	tendon slippage	reeducation of ADLs		
3RD WEEK POST-OP	massage	scar management	motor control exercises	clamp adaptation exercises	proprioception	muscle stretching	analytical mobility on a Canadian pegboard	mirror therapy	analgesic current	reeducation of ADLs	
4TH WEEK POST-OP	massage	scar management	motor control exercises	clamp adaptation exercises	proprioception	muscle stretching	action observation technique	reeducation of ADLs			
5TH WEEK POST-OP	massage	scar management	motor control exercises	pincer adaptation exercises	proprioception	muscle stretching	action observation technique	reeducation of ADLs			
6TH WEEK POST-OP	scar management	motor control exercises	gripper adaptation exercises	proprioception	muscle stretching	MS muscle strengthening	reeducation of ADLs				
7TH WEEK POST-OP	scar management	motor control exercises	gripper adaptation exercises	proprioception	muscle stretching	MS muscle strengthening	progressive weight shifts	stimulating current			
8TH WEEK POST-OP	scar management	motor control exercises	gripper adaptation exercises	proprioception	muscle stretching	MS muscle strengthening	progressive weight shifts	stimulating current	sports reeducation		
9TH WEEK POST-OP	scar management	motor control exercises	gripper adaptation exercises	proprioception	muscle stretching	MS muscle strengthening	progressive weight shifts	stimulating current	sports reeducation		
10TH WEEK POST-OP	scar management	motor control exercises	gripper adaptation exercises	proprioception	muscle stretching	MS muscle strengthening	progressive weight shifts	sports re-education			

Note. Adapted from Banda Rabah, 2017; Basson, et al, 2017; Basson et al, 2015; Instituto Mexicano del seguro social, 2015.

Figure 10.
Items in treatment plan

Pain

Hot chemical compress for 10 minutes. Magneto 50 to 60 HZ, 100 GAUS. 20 minutes on the days when the patient was in the most pain. Mirror Therapy.

Scar

Scar compression by means of Coban bandage initially and later with silicone patches, which were removed to perform the therapy and when the patient had the wound cleaned. Scar liberation by means of massage, mobilization of fasciae, in scars from the first surgery that were already in the maturation phase, liberation was performed by means of instrumental manual therapy with the use of washas. Laser between 10 to 20 J/cm2 for 10 min.

Mobility and dexterity

We work on recovering functional mobility ranges of wrist and long fingers, tendon gliding through passive mobility performed by the therapist and Canadian board, analytical mobility, active mobility assisted by the therapist, active and active mobility with load. Flexor tendon gliding exercises. Occupational therapy focused on the patient's Activities of Daily Living. Joint distraction exercises. Fine gripper and coarse gripper exercises adapted to the amputation. Mirror therapy and observation-action therapy.

Strength and skills

Exercises with weight from 0.5 kg to 2.5 kg Ball throwing without weight and with weight of 2kg. Progressive unloading of own weight. Wrist and upper limb proprioception. Progressive resistance exercises for the wrist and upper limb starting with light resistance (yellow band) up to moderate resistance (blue band) and in fist exercises up to heavy resistance (black band).

Note. Adapted from Banda Rabah, 2017; Basson, et al, 2017; Basson et al, 2015; Instituto Mexicano del seguro social, 2015.

Final physical evaluation (September 20, 2023)

Patient presents with pain 0/10 NR in right hand. Phantom limb pain 1/10 RN. Wound and scars in maturing phase, in good condition.

Table 10.
Results of the Quick DASH

Scoring criteria	% of loss
Disability/Symptoms	15.9

Work Module - this section determines the impact of the arm, shoulder or hand problem on your ability to work (including household chores if this is the main occupation).	6.25
Special Sports/Musical Activities – This section asks about the consequences of an arm, shoulder or hand problem when playing a sport, playing a musical instrument (or both). If you practice more than one sport or play more than one musical instrument, you answer taking into consideration the activity that is more important.	6.25

Table 11.
Goniometric assessment of wrist

Movement	Normal Range	Range of the Patient
FLEXION	50° to 60°	55°
EXTENSION	35° to 60°	50°/60°
RADIAL DEVIATION	0 – 25°/30°	30°
ULNAR DEVIATION	0 – 30°/40°	30°

Table 12.
Goniometric assessment of fingers

Movement	Normal Range	Range of the Patient
MCP FLEXION	0 to 90°	85°
MCP EXTENSION	0 to 30°	30°
PIP FLEXION	0 to 100°	90°
DIP FLEXION	0 to 90°	80°

Table 13.
Dynamometric assessment

Right hand strength	Left hand strength
40KG	18KG

Table 14.
Sensitivity assessment

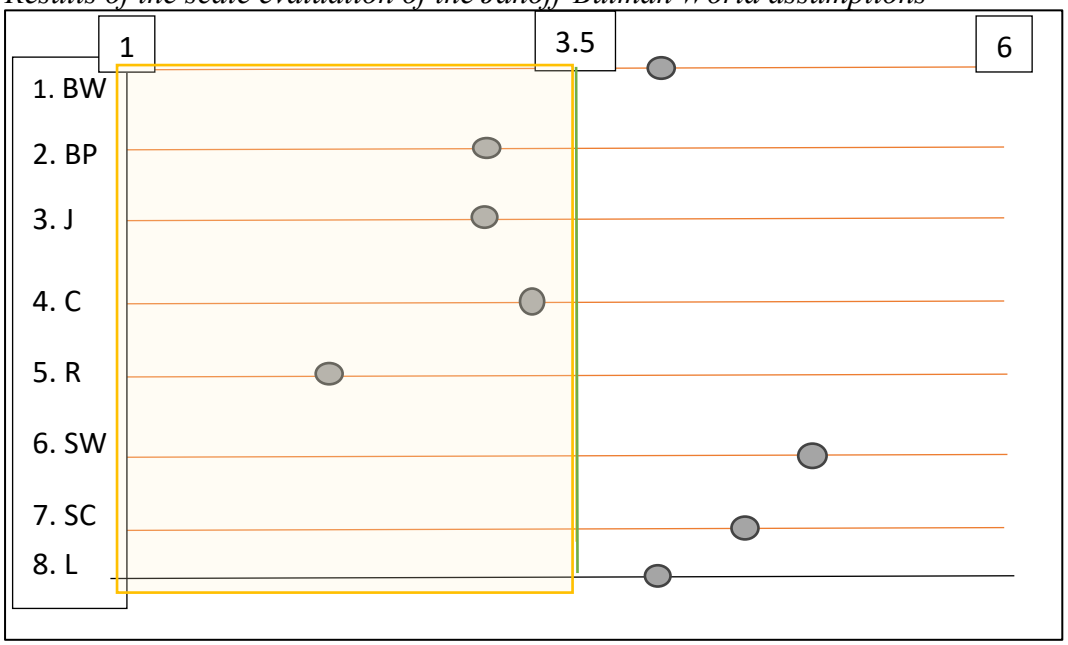
Left hand sensitivity	Right hand sensitivity
Median: 0.07g	Median: 0.07g
Radial: 0.07g	Radial: 10g
Cubital: 0.07g	Cubital: 0.07g

Despite the limitations he presented during the physiotherapy process, either due to the pathology itself (e.g., difficulty in the fine grip, limitation in certain grips, decreased sensitivity in certain areas of the hand, hypertrophic scar) that were performed in the primary approach, a prompt physical recovery is evidenced, which caught the specialist's attention and encouraged him to perform an evaluation of his adaptive skills. Therefore, the second phase is performed at the end of the physical rehabilitation process, in which the patient showed positive psychological attitudes (he showed practically no post-amputation mourning), which notoriously influenced his early recovery.

Phase 2: Psychological evaluation

Figure 11.

Results of the scale evaluation of the Janoff-Bulman World assumptions



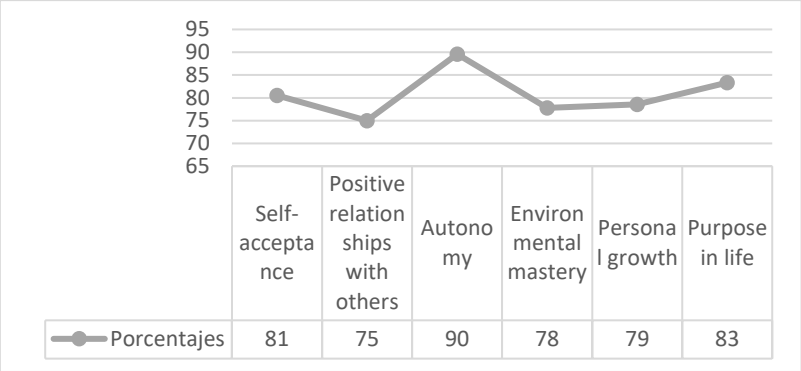
Note. In the figure on the left square are highlighted those variables whose results are lower than the proposed norm (3.5).

The results of the scale evaluation of the World assumptions of Janoff-Bulman show that most of the beliefs of patient X are at levels higher than the norm proposed by the author, which indicates how much adaptability a subject can have to the changes that occur, i.e. his resilient potential (see Figure 11). The variables "Kindness of people", "Justice of the world", "Control" and "Chance of events" have lower values, which indicates a certain maladaptive reaction with the world and with the social; on the other hand, the variables related to the concept of "I" that have to do with self-esteem are at very good levels, which is possibly the basis of their highly resilient attitude during the rehabilitation process.

1) Benevolence of the world: 3.75
2) Benevolence of the people: 3
3) Justice: 3
4) Controllability: 3.25
5) Randomness: 2
6) Self-worth: 4.25
7) Self-control: 4
8) Luck: 3.75

Figure 12.

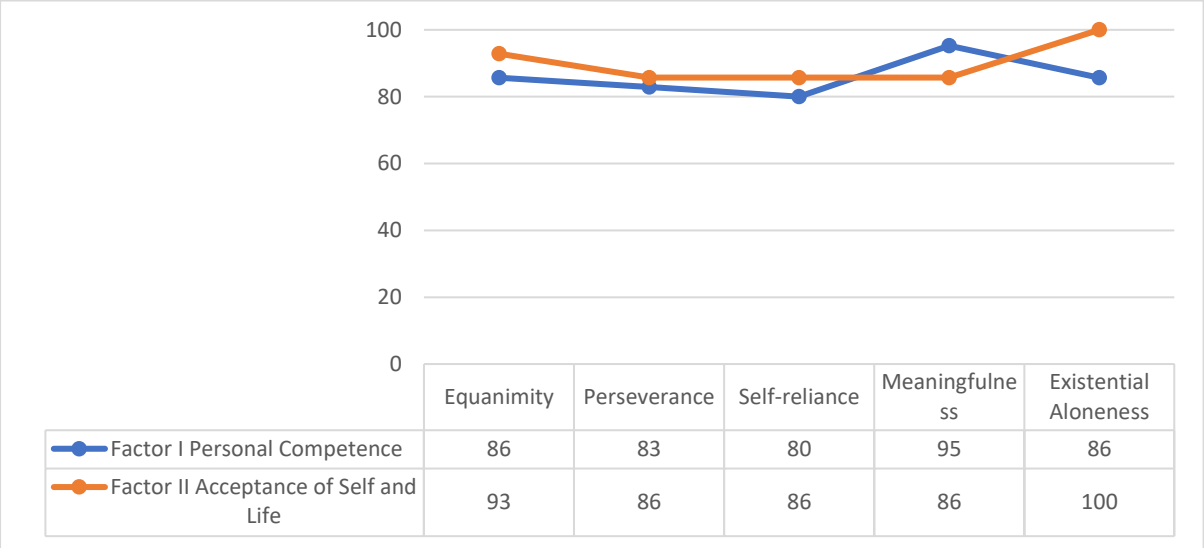
Percentage of psychological well-being variables with RYFF scales



The results of the psychological well-being assessment with the RYFF scales show high percentages in each of the scales (see Figure 12).

Figure 13.

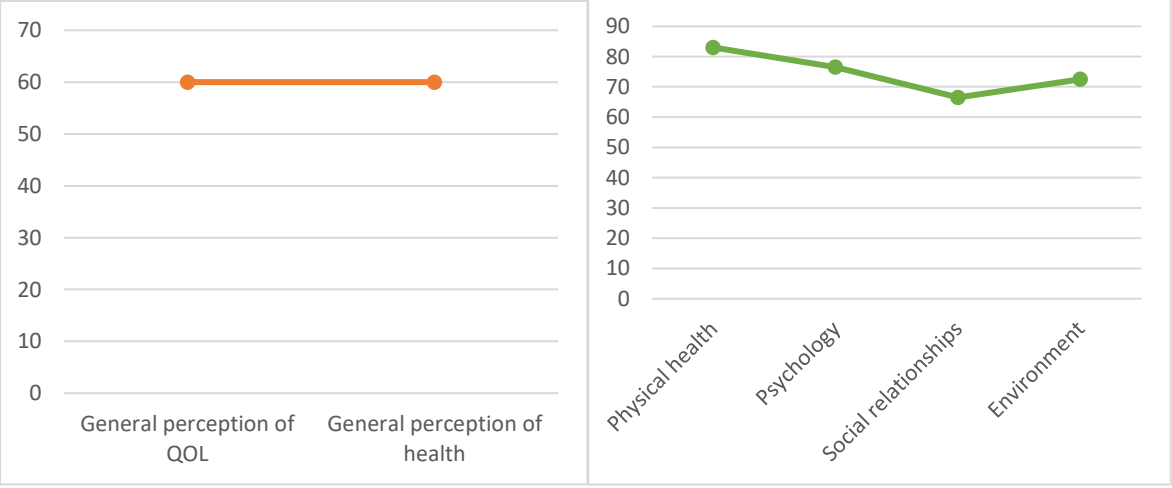
Percentage of resilience variables of the Wagnild & Young scale



The percentages obtained for resilience, using the Wagnild & Young scale show both factors with high values for both personal competence and self-acceptance (see Figure 13).

Figure 14.

Level of quality of life and variables of the WHOQOL-BREF



Note. >60% high and <60% low

According to the norm proposed by Freire de Oliviera et.al (2008) the parameters of quality of life measured with the WHOQOL-BREF indicate high levels in all areas and facets of quality of life and health (see Figure 14).

Discussion

The methodology used to evaluate the present case and the progress of patient X was effective both in the pre-surgical and post-surgical phases, using the methodology proposed by Pérez Mármol (2020). Based on the final physical evaluation, it can be concluded that the patient recovered his functionality and can perform his activities of daily living without major difficulty. The progress achieved in the rehabilitation also allowed the patient to return to his work activities. It is also emphasized that despite the limitations he may have due to the loss of his thumb, the patient has developed other skills with his long fingers to compensate for this lack.

An important factor in the recovery was the positive attitude of the patient throughout the recovery process, which allowed the therapist to perform as many exercises and/or techniques as possible with a favorable response. As can be seen from the psychological evaluation, the levels of the characteristics of World assumptions, psychological well-being, resilience and quality of life of the patient are in a highly adaptive state. The results obtained and described in this document fully coincide with the points emphasized by Méndez (2010), highlighting the importance of pain assessment and management, the timely initiation of physiotherapeutic, kinesiological and occupational treatment, and the importance of the patient's resilient potential.

Conclusion

The conclusions of this pilot study show that the characteristics of patient X can be considered “uncommon”, according to Vargas Mendoza and Villavicencio Espinoza (2011), who conducted a survey to determine resilience levels in 10 recently amputated patients, and found that only one of the subjects evaluated showed to be a resilient person; therefore, they considered that the others needed a support program to strengthen their resilience and improve their rehabilitation process in both the physical and emotional areas.

The limitation of the present study is of course related to the study of a single case, which in no way determines generalities about these results, but generates academic questions about the subject of resilience in cases of hand amputation and the prospects for more complete studies. In the future, it would be of great value the complementary evaluation of characteristics such as coping strategies, anxiety levels, depression or posttraumatic stress in several patients to define the relationship of these sequelae with the variables of World assumptions, psychological well-being, resilience and quality of life in order to define the edges for possible effective psychological accompaniment during rehabilitation.

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