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Research Article

Use of Botulinum Toxin and Phenol to Treat Muscle Tone Disorders in Adult Patients Seen at a Rehabilitation Center

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ABSTRACT

Objective: To understand the epidemiological profile of the adult outpatient clinic for neurolytic block at a rehabilitation center, and to compare the outcomes, based on achieved goals and clinical parameters, with duration of injury.

Methods: A longitudinal, analytical, census-based study, with data collected from the adult chemical block outpatient clinic, between January 2022 and December 2023. The epidemiological data, number of previous blocks, initial and achieved goals, scores, type of block, side effects, results measured by the Ashworth scale, and range of motion by goniometry were extracted from the electronic medical records on the day of the injection and at the four-week reassessment visit.

Results: In the adult chemical block outpatient clinic, a total of 156 procedures were performed; in that, 51.3% of patients were male and mean age was 48.9 years. The most frequent clinical and topographic diagnoses were stroke (60.9%) and hemiparesis (66%), respectively. As to the indications of the procedures, 76.9% were positioning, 41.7% functional improvement, and 33.3% for orthotic management. The goals were achieved in 72.7% of procedures. The gastrocnemius was the muscle more often treated with botulinum toxin type A (89 cases, 28.5%), whereas the anterior branch of obturator nerve was the most frequently blocked nerve group with phenol (25 injections; 8%). There was no statistical difference between the achieved goals and duration of injury in patients undergoing the procedure (p=0.670).

Conclusion: The initial characterization of the adult chemical block outpatient clinic in 2022 and 2023 was consistent with the literature. Stroke was the most common diagnosis, and duration of injury had no impact on the outcomes of the procedure, indicating patients with a longer history of the condition may also benefit from neurochemical block.

Keywords: Muscle spasticity; Dystonia; Neuromuscular block; Rehabilitation; Nervous system diseases; Stroke

INTRODUCTION

Central Nervous System (CNS) diseases are increasingly more frequent and result in many sequelae and disabilities for patients [1]. The most common CNS diseases in adults comprise stroke, Traumatic Brain Injury (TBI), sequelae of anoxia, CNS tumors, Spinal Cord Injury (SCI), and degenerative conditions, such as multiple sclerosis. The most common consequence of these diseases is the onset of movement disorders. Lesions may occur in the pyramidal or extrapyramidal systems, the former being more common [2]. The injuries in the extrapyramidal system present as involuntary movements, such as dystonia, athetosis and chorea, among others. In pyramidal system injuries, abnormalities like spasticity can be observed [3].

Spasticity, also known as spastic hypertonia, is a motor control disorder resulting from an injury in the upper motor neuron that presents as involuntary and exacerbated muscle activation. It is clinically characterized by increased velocity-dependent muscle tone and is accompanied by other signs of upper motor neuron syndrome, such as clonus, spasms, or simultaneous contractions of antagonist muscle groups [2].

Spasticity is extremely prevalent and can also be very limiting. It may cause pain, postural changes, and movement limitations; progress to joint deformities over time; interfere with daily activities like dressing, hygiene, and walking, thus restricting the

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individual's participation in tasks. In some cases, it may assist with certain tasks, such as maintaining an upright posture, when the patient has severe muscle weakness; However, in general, it is a limiting factor [2,3].

There are several treatments, ranging from the most conservative, like physical therapy and the use of orthoses, to orthopedic or neurological surgeries [3]. Neurolytic block is one management modality for spasticity and dystonia.

This study aims to understand the epidemiological profile of an adult outpatient clinic and compare the outcomes, based on achieved goals and clinical parameters, with duration of injury in patients undergoing neurolytic block at a rehabilitation center.

METHODS

This is a longitudinal, analytical, census-based study in which an active search of appointments was conducted at the adult Chemical Block (CB) outpatient clinic. The patients were seen through the modality National Health System (SUS, acronym in Portuguese) and referred by physiatrists at a rehabilitation reference center in the city of Sao Paulo, Brazil, between January 2022 and December 2023. The exclusion criterion was incomplete medical records.

Data were gathered from electronic medical records on the day of the injection and on the day of reassessment, which occurs, on average, four weeks later. The following data were collected: Epidemiological data; The amount of previous blocks; the muscle or nerve sites treated; Doses; Simple or mixed blocks (phenol combined with botulinum toxin type A - BTA); Side effects; Initial goals (function, positioning on wheelchair and standing up, orthotic management, hygiene, dressing, and pain relief) and achieved goals (defined based on patient's and family's perception, together with the rehabilitation team); Outcomes (modified Ashworth scale and range of motion, measured in degrees using a goniometer); Use of orthoses; Previous orthopedic surgery; And history of current rehabilitation therapies.

Data were described using frequency and confidence intervals for qualitative variables, and measures of central tendency (mean and median) and measures of dispersion (standard deviation, interquartile range, minimum and maximum values) for quantitative variables. Association between qualitative variables was checked by the chi-squared test, and comparisons between qualitative and quantitative variables were conducted using the Mann-Whitney test. All analyses were performed using R software[1] and results with a p-value less than 5% were considered statistically significant. Injury duration was grouped into categories of up to 2 years, 2 to 4 years, and more than 4 years for statistical purposes. Likewise, the modified Ashworth scale was subdivided into 0, 1, 1+, 2, 3, and 4; in that, 1+ was replaced by 1.5 for the analyses.

The study was submitted to and approved by the Ethics and Research Committee on August 27, 2024, CAAE 80463224.3.0000.0085, opinion number 7.034.621.

RESULTS

A total of 156 chemical blocks with Botulinum Toxin A (BTA) and/or phenol in 138 patients at the adult outpatient clinic were analyzed during the study period. Age ranged from 18 to 84 years, mean age of 48.9 years (SD: 17.6), with predominance of males (51.3%). The interval between the injury, in the case of conditions acquired throughout life, and the injection ranged from 1 to 28 years, with a mean of 7.2 years (SD: 6.51), and for 55.8% of participants the interval was more than 4 years since onset of injury (Table 1).

Table 1: Qualitative and quantitative sociodemographic variables of patients, including number (n), frequency (%), and 95% confidence interval (95% CI) for adult patients.

Variable	Categories	n	% (95% CI)
Sex	Male	80	51.3 (43.6-59.6)
	Female	76	48.7 (41.0-57.0)
Clinical diagnosis	Stroke	95	60.9 (53.8-68.6)
	Cerebral palsy	25	16.0 (9.0-23.7)
	TBI	11	7.1 (0.0-14.7)
	Spinal cord injury	10	6.4 (0.0-14.1)
	Anoxia after CPA	7	4.5 (0.0-12.2)
	Other	8	5.1 (0.0-12.8)
Topographic diagnosis	Hemiparesis	103	66.0 (59.6-73.6)
	Bilateral hemiparesis	18	11.5 (5.1-19.1)
	Diparesis	12	7.7 (1.3-15.3)
	Paraplegia/paraparesis	11	7.1 (0.6-14.6)
	Tetraparesis	11	7.1 (0.6-14.6)
	Dyskinetic cerebral palsy	1	0.6 (0.0-8.2)

Previous chemical block	0	58	51.3 (42.5-61.0)
	1	29	25.7 (16.8-35.4)
	2	14	12.4 (3.5-22.1)
	3	6	5.3 (0.0-15.0)
	4	5	4.4 (0.0-14.1)
	5	1	0.9 (0.0-10.6)
Spasticity	No	3	1.9 (0.6-4.1)
	Yes	153	98.1 (96.8-100.0)
Dyskinesia	No	131	84.0 (78.8-89.8)
	Yes	25	16.0 (10.9-21.8)
ASIA (Patients with SCI)	B	2	22.2 (0.0-54.6)
	D	6	66.7 (44.4-99.1)
	Undetermined	1	11.1 (0.0-43.5)
Duration of injury	Up to 2 years	30	23.3 (14.7-32.2)
	2 to 4 years	27	20.9 (12.4-29.9)
	More than 4 years	72	55.8 (47.3-64.8)
Therapies	No	55	35.3 (28.2-43.3)
	Yes	101	64.7 (57.7-72.8)
Ortheses	No	21	13.5 (9.0-19.1)
	Yes	134	86.5 (81.9-92.0)

Note: TBI: Traumatic Brain Injury, Cardiopulmonary arrest, ASIA: American Spinal Injury Association impairment scale, SCI: Spinal cord injury

The most frequent clinical and functional diagnoses were, respectively, sequelae of stroke (60.9%) and hemiparesis (66.0%), and the most prevalent movement disorder was spasticity (98.1%). Fifty-eight (51.3%) patients were undergoing their first injection (Table 1), and 19 (12.1%), the second injection at the outpatient clinic. Of the treatments performed, 137 (87.8%) used BTA, 13 (8.3%) phenol, and 6 (3.8%) involved a combination of both. (Table 2).

Table 2: Characteristics of procedures, including number (n), frequency (%), and 95% confidence interval (95% CI), for adult patients.

Variable	Categories	n	% (95% CI)
Localization method	Anatomical	137	87.8 (83.3-92.9)
	Electrical stimulation	19	12.2 (7.7-17.3)
Type of block	BTA	137	87.8 (83.3-92.6)
	Phenol	13	8.3 (3.8-13.1)
	Combined	6	3.8 (0.0-8.7)
ENMG before the injection	No	21	95.5 (90.9-100.0)
	Yes	1	4.5 (0.0-12.4)
	Min-Max	N	Mean (±SD)
Total BTA per dose (U)	100-1,500	129	881.1 (±399.4)
Total phenol per dose (ml)	1.5-10.0	19	4.9 (±1.9)

Note: ENMG: Electroneuromyography

On average, 881 units of BTA (injections of 500 units of abobotulinum toxin A) were administered (SD: 399.4 U). All procedures were performed at the outpatients clinic, using the method of anatomical localization in 87.8% of cases. A total of 64.7% of patients were on therapy, 86.5% were using orthoses, 25.6% had been submitted to orthopedic surgery. One patient with dyskinesia underwent electroneuromyography mapping prior to treatment. (Table 2).

The main therapeutic objectives were improvement in positioning (76.9%), optimized function of the treated limb (41.7%), and enabling orthotic management (33.3%). After the intervention, the goals were fully achieved in 101 cases (72.7%) and partially achieved in 30 (21.6%) (Table 3). Missing data in reassessment was observed in 17 patients (11%).

Table 3: Reported objectives for neuromuscular block in adult patients, including number (n), frequency (%), and 95% confidence interval (95% CI).

	Categories	n	% (95% CI)
Positioning	No	36	23.1 (16.7-29.5)
	Yes	120	76.9 (70.5-83.4)
Function	No	91	58.3 (50.6-66.3)
	Yes	65	41.7 (34.0-49.7)
Orthotic management	No	104	66.7 (59.6-74.4)
	Yes	52	33.3 (26.3-41.1)
Hygiene	No	129	82.7 (77.6-88.9)
	Yes	27	17.3 (12.2-23.5)
Pain relief	No	136	87.2 (82.7-92.5)
	Yes	20	12.8 (8.3-18.1)
Dressing	No	143	91.7 (87.8-95.7)
	Yes	13	8.3 (4.5-12.3)
Achieved goals	No	8	5.8 (0.0-13.6)
	Partially	30	21.6 (15.1-29.4)
	Yes	101	72.7 (66.2-80.5)

The gastrocnemius was the muscle more often treated with BTA (28.5%), whereas the Anterior Branch of the Obturator Nerve (ABON) was the nerve group most frequently blocked with 5% phenol (25 injections; 8.0%), and maximum volume per injection site of 5 mL and a total of 10 mL. (Table 4) describes the most commonly treated muscles in the upper and lower limbs. In addition, other muscles blocked in descending order of frequency comprised flexor hallucis longus, hamstring, tibialis anterior, extensor hallucis longus, and fibularis longus in the lower limbs; and interosseus, flexor pollicis longus, flexor carpi radialis, flexor digitorum profundus, adductor pollicis, triceps brachii, palmaris longus, and pronator teres in the upper limbs.

Table 4: Muscles most frequently treated in the upper and lower limbs with botulinum toxin and nerves most often treated with phe-nol, including number (n), frequency (%), and 95% confidence interval (95% CI), broken down by side of injection and total number of muscles or nerves evaluated in adult patients.

Upper limb muscles	Categories	Right		Left		Total
		n	% (95% CI)	n	% (95% CI)	
Biceps brachii	No	118	75.6 (69.2-82.4)	122	78.2 (72.4-85.0)	240 (76.9)
	Yes	38	24.4 (17.9-31.1)	34	21.8 (16.0-28.6)	72 (23.1)
Pectoralis major	No	121	77.6 (71.8-84.5)	121	77.6 (71.8-84.5)	242 (77.6)
	Yes	35	22.4 (16.7-29.4)	35	22.4 (16.7-29.4)	70 (22.4)
Flexor digitorum superficialis	No	116	74.4 (67.9-81.4)	128	82.1 (76.9-88.4)	244 (78.2)
	Yes	40	25.6 (19.2-32.7)	28	17.9 (12.8-24.3)	68 (21.8)
Brachioradialis	No	128	82.1 (76.9-88.4)	129	82.7 (77.6-88.9)	257 (82.4)
	Yes	28	17.9 (12.8-24.3)	27	17.3 (12.2-23.5)	55 (17.6)

Flexor carpi ulnaris	No	129	82.7 (77.6-88.9)	132	84.6 (79.5-90.2)	261 (83.7)
	Yes	27	17.3 (12.2-23.5)	24	15.4 (10.3-21.0)	51 (16.3)
Opponens pollicis	No	131	84.0 (78.8-89.8)	136	87.2 (82.7-92.5)	267 (85.6)
	Yes	25	16.0 (10.9-21.8)	20	12.8 (8.3-18.1)	45 (14.4)
Lower limb muscles	**Categories**	**Right**		**Left**		**Total (%)**
		n	**% (95% CI)**	**n**	**% (95% CI)**	
Gastrocnemius	No	109	69.9 (62.8-77.1)	114	73.1 (66.7-80.4)	223 (71.5)
	Yes	47	30.1 (23.1-37.4)	42	26.9 (20.5-34.2)	89 (28.5)
Tibialis posterior	No	123	78.8 (73.1-85.5)	135	86.5 (82.1-92.1)	258 (82.7)
	Yes	33	21.2 (15.4-27.8)	21	13.5 (9.0-19.0)	54 (17.3)
Soleus	No	138	88.5 (84.0-93.3)	142	91.0 (87.2-95.4)	280 (89.7)
	Yes	18	11.5 (7.1-16.3)	14	9.0 (5.1-13.3)	32 (10.3)
Rectus femoris	No	146	93.6 (90.4-97.3)	138	88.5 (84.0-93.3)	284 (91)
	Yes	10	6.4 (3.2-10.1)	18	11.5 (7.1-16.3)	28 (9)
Flexor digitorum longus	No	138	88.5 (84.0-93.3)	146	93.6 (90.4-97.3)	284 (91)
	Yes	18	11.5 (7.1-16.3)	10	6.4 (3.2-10.1)	28 (9)
Adductor magnus	No	148	94.9 (92.3-98.4)	147	94.2 (91.0-97.5)	295 (94.6)
	Yes	8	5.1 (2.6-8.7)	9	5.8 (2.6-9.0)	17 (5.4)
Nerve	**Categories**	**Right**		**Left**		**Total (%)**
		n	**% (95% CI)**	**n**	**% (95% CI)**	
Musculocutaneous	No	156	100	151	96.8 (94.9-99.6)	307 (98.4%)
	Yes	0	-	5	3.2 (1.3-6.0)	5 (1.6%)
Anterior branch of obturator	No	143	91.7 (87.8-95.7)	144	92.3 (89.1-96.6)	287 (92%)
	Yes	13	8.3 (4.5-12.3)	12	7.7 (4.5-12.0)	25 (8%)

Eighteen (11.5%) patients reported adverse effects, and pain was the most frequent complaint (9,6.3%), followed by weakness (5,3.5%), malaise (1,0.7%), dry mouth (1,0.7%) and double and blurred vision (1,0.7%). No patient reported more than one adverse effect.

As to the modified Ashworth scale in the adult outpatient clinic, prior to the procedure, in the upper limbs, we observed the highest frequency of scores 2 (41% right; 54% left), while after the procedure, the most frequent score was 1 (54.5% right; 38.5% left). And for the lower limbs, the most frequent score before the procedure was 1+ for both sides (41% right; 31.7% left), whereas after the procedure the most frequent score was 1 (54% right; 54% left).

Prior to block, the Range of Motion (ROM) was measured by goniometer as follows: The most frequent for shoulder was 90° (5.1%); For elbow, absence of extension and flexion deficit (0°) (19.9%); For wrist, absence of extension and flexion deficit (0°) (30.1%); For knee, absence of extension and flexion deficits (0°) (18.6%), ankle dorsiflexion with flexed knee varied from 0° to 5° (25.6%). After block, the ROM for shoulder was 90° (3.8%); for elbow, absence of extension and flexion deficit (0°) (20.5%); For wrist, absence of extension and flexion deficit (0°) (26.9%); For knee, absence of extension and flexion (0°) (10.9%), and for ankle dorsiflexion with flexed knee, no information was available (19.9%). Missing data in reassessments was observed in 19.9% of cases.

No significant difference could be demonstrated between total or partial achievement of goals for different durations of injury (p-value = 0.670) (Table 5).

We found no statistically significant association between the difference in range of motion and duration of injury (elbow p-value = 0.545, knee p-value = 0.984, abrupt hip ab-duction p-value = 0.100, ankle dorsiflexion with extended knees p-value = 0.875, ankle dorsi-flexion with flexed knees p-value = 0.340) (Table 6).

No statistically significant association was found between the change in the Ashworth scale during neuromuscular block and duration of injury in adult patients (for upper limbs p=0.616, and for lower limbs p=0.373) (Table 7).

Table 5: Proportion of partial or total success in achieving the goals set for neuromuscular block, in each group of duration of injury, in adult patients.

Variable	Up to 2 years		2 to 4 years		More than 4 years		p-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Achieved goals							
No	1	4.0 (0.0-23.7)	1	4.2 (0.0-20.4)	5	7.8 (0.0-19.8)	0.67
Partially	8	32.0 (16.0-51.7)	4	16.7 (4.2-32.9)	14	21.9 (12.5-33.8)	
Yes	16	64.0 (48.0-83.7)	19	79.2 (66.7-95.4)	45	70.3 (60.9-82.3)	

Table 6: Association between the difference in range of motion (final - baseline) and duration of injury in adult patients undergoing neuromuscular block.

	n	Absent	Mean (±SD)	Median (IQR)	Min-Max	p-value
Elbow						
Up to 2 years	17	43	-2.6 (±5.3)	0.0 (0.0-0.0)	-15	0.614
2 to 4 years	13	41	-5.2 (±10.7)	0.0 (-2.0-0.0)	-35	
More than 4 years	35	109	-4.1 (±19.8)	0.0 (0.0-0.0)	-130	
Knee						
Up to 2 years	13	47	0.4 (±1.4)	0.0 (0.0-0.0)	0.0-5.0	0.245
2 to 4 years	7	47	-1.7 (±4.5)	0.0 (0.0-0.0)	-12	
More than 4 years	13	131	0.8 (±2.8)	0.0 (0.0-0.0)	0.0-10.0	
Abrupt abduction with flexed knees						
Up to 2 years	6	54	21.5 (±3.9)	22.0 (20.0-24.8)	15.0-25.0	0.136
2 to 4 years	5	49	15.2 (±4.4)	17.0 (11.0-18.0)	10.0-20.0	
More than 4 years	13	131	18.2 (±8.3)	17.0 (13.0-20.0)	10.0-40.0	
Ankle dorsiflexion with extended knee						
Up to 2 years	12	48	1.2 (±4.5)	0.0 (0.0-5.0)	-16	0.168
2 to 4 years	10	44	4.6 (±5.4)	5.0 (0.2-10.0)	-15	
More than 4 years	30	114	1.9 (±5.4)	0.0 (0.0-5.0)	-30	
Ankle dorsiflexion with flexed knee						
Up to 2 years	13	47	0.5 (±5.6)	0.0 (0.0-0.0)	-20	0.425
2 to 4 years	10	44	1.0 (±2.1)	0.0 (0.0-0.0)	0.0-5.0	
More than 4 years	30	114	3.0 (±6.1)	0.0 (0.0-5.0)	-25	

Table 7: Association between the difference in Ashworth scale grading (final - baseline) and duration of injury in adult patients un-dergoing neuromuscular block.

Variable	Up to 2 years		2 to 4 years		More than 4 years		p-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Upper limb							
-2	1	5.3 (0.0-28.0)	2	13.3 (0.0-42.0)	2	4.8 (0.0-21.4)	0.616
-1.5	0	0.0 (0.0-22.8)	1	6.7 (0.0-35.3)	2	4.8 (0.0-21.4)	
-1	6	31.6 (10.5-54.3)	4	26.7 (6.7-55.3)	15	35.7 (21.4-52.4)	
-0.5	6	31.6 (10.5-54.3)	7	46.7 (26.7-75.3)	14	33.3 (19.0-50.0)	
0	5	26.3 (5.3-49.1)	1	6.7 (0.0-35.3)	9	21.4 (7.1-38.1)	
1	1	5.3 (0.0-28.0)	0	0.0 (0.0-28.6)	0	0.0 (0.0-16.6)	

Lower limb							
-2	0	15.8 (0.0-41.7)	3	20.0 (0.0-48.5)	3	6.7 (0.0-22.8)	0.373
-1.5	2	10.5 (0.0-36.5)	2	13.3 (0.0-41.8)	4	8.9 (0.0-25.1)	
-1	12	15.8 (0.0-41.7)	5	33.3 (13.3-61.8)	10	22.2 (8.9-38.4)	
-0.5	12	15.8 (0.0-41.7)	2	13.3 (0.0-41.8)	16	35.6 (22.2-51.7)	
0	4	36.8 (21.1-62.8)	3	20.0 (0.0-48.5)	12	26.7 (13.3-42.8)	
0.5	1	5.3 (0.0-31.2)	0	0.0 (0.0-28.5)	0	0.0 (0.0-16.2)	

DISCUSSION

The data collected at the chemical block outpatient clinic of a rehabilitation reference center for adults reflect the profile of the conditions most commonly associated with muscle tone disorders. Acquired Brain Injuries (ABI) accounted for approximately 75%; in that, stroke was the most prevalent (60.9%). Similar findings were reported in an international multicenter study, in which the majority of patients (97%) presented with spasticity due to ABI [3].

It was not possible to demonstrate a significant difference between achieving total or partial goals for different durations of injury. The data include a small sample of patients relative to the percentage of failures (7 patients, 6.2%), or even partial successes (26 patients, 23%), which limits the ability to detect minor differences in this outcome. Furthermore, we found no statistically significant association between the difference in range of motion and the Ashworth scale and the duration of injury of patients (Tables 4, 5, and 6). This finding may indicate that even more than four years after injury, the procedure can still be effective, justifying its use. Likewise, a Brazilian multicenter study demonstrated a mean interval of nearly two years between the onset of spasticity after stroke and the first injection of BTA. Chronic patients were assessed using the Goal Attainment Scaling (GAS), functional independence, range of motion, pain, and Ashworth scales, and showed positive outcomes with the injections during the one-year follow-up [4].

In the adult outpatient clinic, the positioning goal (standing up, use of wheelchair use, sitting on bed) was the most common (77%), followed by improvement in function (41%), which was also found to be the most frequent goal in the literature in 51% of publications [3]. The goals were fully or partially achieved in 84% of procedures in the adult outpatient clinic; Therefore, the blocks were appropriately indicated by the physiatrists of the organization, setting adequate goals in most cases.

Regarding the frequency of injections, 51.3% of patients underwent their first nerve block during this period; Nonetheless, this figure differs from data of an international multicenter study, in which 24% of patients were submitted to their first procedure during the study period [3]. The organization is a rehabilitation reference center, predominantly receiving patients with complex conditions who, in many cases, had not been previously treated for movement disorders in the primary health care system. A lower frequency of re-injections per patient was also observed as compared to other services (10.7%). This finding may be related to the fact that most patients are enrolled in structured rehabilitation programs, with continuous therapeutic follow-up and regular use of orthoses, and such strategies can contribute to maintaining functional gains and postponing the need for new procedures.

In a meta-analysis conducted in 2021 [5], the optimal dose for the best outcome of lower limb spasticity was 1,000 U of Abobotulinum toxin A and 300 U of Onabotulinum toxin A, and injected primarily into the gastrocnemius and soleus muscles. In our study, the mean dose of BTA per adult patient was 881 units of Abobotulinum toxin A, and the gastrocnemius was the most often treated muscle. The most frequently reported side effects in the literature among patients with post-stroke sequelae receiving BTA were pain at the injection site, pain in the treated limb and weakness, as also described in this study [6].

We also included adults with cerebral palsy, unlike the international multicenter study [3] that excluded them due to the impact of spasticity on musculoskeletal development and the presence of joint deformities in many cases. However, including them is of paramount importance for a better understanding of the disease, since the goals of the procedure may not be related to function but rather to facilitating hygiene and dressing, thereby impacting on quality of life of patients and their caregivers.

The use of botulinum toxin is already listed as one of the gold standard treatments in the guidelines for stroke in adults of the American Heart Association and the American Stroke Association. The injection in upper limb muscles is recommended to reduce spasticity, improve passive or active range of motion, and improve conditions related to dressing, hygiene, and positioning. In the lower limbs, botulinum toxin is also recommended to reduce spasticity that interferes with gait [7].

The limitations of this study include missing data in reassessment visits at the adult outpatient clinic (11%), a fact that may occur due to inappropriate completion of the follow-up form or to difficulties in providing social and financial support for patients to attend appointments. Still, to increase objectivity of the goals, in addition to what has already been used (the Ashworth scale and range of motion), the Goal Attainment Scaling (GAS) [8] could be employed, with numerical measurement of the extent to which the goals were or were not achieved.

CONCLUSIONS

The initial overview of the adult outpatient chemical block clinic in 2022 and 2023 was consistent with the findings described in the literature. Stroke was the most prevalent disease, and duration of injury did not influence the outcomes of the procedure. Thus, patients with longer duration of injury may also benefit from neurochemical block and remain eligible for it.

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