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ARTHROSCOPIC FOOT AND ANKLE SURGERY: BRAZILIAN SURGEON PROFILE

CIRURGIA ARTROSCÓPICA DO PÉ E TORNOZELO: PERFIL DO CIRURGIÃO BRASILEIRO

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ABSTRACT

Objective: To study the profile of the practice of arthroscopy among ankle and foot surgeons in Brazil and its evolution in recent years. Methods: Observational, cross-sectional study, using a survey sent to all members of the *Associação Brasileira de Medicina e Cirurgia do Tornozelo e Pé* (ABTPé) in 2017 and 2019. Results: In total, 75 surgeons participated in 2017 and 82 in 2019 and most had over 10 years of experience. Of these, 56 participants in 2017 (75%) and 68 in 2019 (82%) used arthroscopy. The number of specialists with no to five years of experience ($p = 0.027$) and who learned the technique during fellowship ($p = 0.007$) increased. The use of the 4.0 mm optics and 30° optics ($p = 0.040$) increased whereas the routine use of traction ($p = 0.049$) and radiofrequency ($p = 0.002$) decreased. The main pathology treated with anterior ankle arthroscopy was bone injury. The most frequent complication was neuropraxia. Conclusion: Most of the foot and ankle surgeons who use arthroscopy have more than 10 years of experience, performed anterior access, and are concentrated in the Southeast region of the country. The number of younger surgeons who learned the technique during fellowship increased. ***Level of Evidence III, Cross-Sectional Comparative Study.***

Keywords: Arthroscopy. Ankle Joint. Orthopedics.

RESUMO

Objetivo: Mostrar o perfil da prática da artroscopia entre cirurgiões de tornozelo e pé no Brasil e sua evolução nos últimos anos. Métodos: Estudo observacional, transversal, realizado por meio de questionário eletrônico enviado para todos os membros da Associação Brasileira de Medicina e Cirurgia do Tornozelo e Pé (ABTPé) em 2017 e 2019. Resultados: Obtivemos 75 respondentes em 2017 e 82 em 2019; a maioria tinha mais de 10 anos de experiência. Dos respondentes, 56 realizavam artroscopia em 2017 (75%) e 68 em 2019 (82%). Foi observado aumento no número de especialistas com até 5 anos de experiência ($p = 0,027$) e que aprenderam a técnica durante o estágio de especialização ($p = 0,007$). Houve aumento no uso da ótica de 4,0 mm e 30° de angulação ($p = 0,040$), e diminuição do uso rotineiro de tração ($p = 0,049$) e de radiofrequência ($p = 0,002$). A principal patologia tratada com artroscopia anterior do tornozelo foi o impacto ósseo, e a complicação mais frequente foi a neuropraxia. Conclusão: A maioria dos cirurgiões de pé e tornozelo que utiliza artroscopia tem mais de 10 anos de experiência, usa o acesso anterior e concentra-se na região Sudeste do país. Foi observado aumento no número de cirurgiões mais novos e que aprenderam a técnica durante o estágio de especialização. ***Nível de Evidência III, Estudo Transversal Comparativo.***

Descritores: *Artroscopia. Articulação do Tornozelo. Ortopedia.*

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INTRODUCTION

Ankle and foot arthroscopic surgery was first performed by Burman[1] on cadavers in 1931. Takagi[2] later modified it, successfully describing the ankle arthroscopic access system for the first time in 1939. However, it was not until the 1970s that arthroscopy started becoming an important tool to diagnose and treat lesions in the foot and ankle.[3] Surgery by arthroscopic access has become increasingly frequent and popular among orthopedic surgeons. Ankle arthroscopy has developed parallel to the arthroscopic procedure of other joints, such as knees and shoulder. The surgery was initially described for treating loose joint bodies and bone and soft tissue injuries,[4] but technological evolution and optics of increasingly smaller calibers and high image quality, associated with the use of multiple portals, allowed visualizing and treating several pathologies of the foot and ankle. More recently, studies[5-7] have developed posterior ankle arthroscopy and tendoscopy, which allowed excellent access to posterior ankle structures, to the subtalar joint, and to extra-articular structures. Other recent advances include arthroscopy of the midfoot and forefoot.[8]

All authors declare no potential conflict of interest related to this article.

The study was conducted at Instituto Vita.
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The method was first reported in Brazil in 1994 when Nery et al.[9] used it for treating anterior ankle impingement. Although arthroscopy has been increasingly used in recent years, Brazil has no surveys on the use of this technique.

This study aimed to show the profile of arthroscopic surgery among ankle and foot surgeons in Brazil and perform a comparative evolution between recent years.

METHODS

This study was approved by the Research Ethics Committee of our institution with registration on Plataforma Brasil under No. 11311119.4.0000.5404. All participants signed an informed consent form.

The research began by sending an email with a questionnaire (Figure 1) to all members of the Brazilian Association of Medicine and Ankle and Foot and Surgery (ABTPé) in 2017 and 2019, with 504 and 635 associates, respectively. After a month, a new email, now accompanied by a reminder on an instant messaging app (WhatsApp), reinforced the initial request. The questionnaire contained 21 questions about the practices of foot and ankle arthroscopic surgery. The questions were closed but allowed more than one answer, following a logical sequence and facilitating the completion of the questionnaire. They addressed the region of the country where interviewees worked, their years of surgical practice, use of arthroscopy and its characterization, site of arthroscopic training, anesthesia and the use of tourniquet, arthroscopic techniques used, number of surgeries performed per year, main indications and material used in anterior, posterior, and subtalar arthroscopy, use of radiofrequency, traction, and infusion pump, and main complications.

What region of the country do you work in?
- ☐ North
- ☐ Northeast
- ☐ Midwest
- ☐ Southeast
- ☐ South
- ☐ Foreigner

How many years have you been performing foot and ankle surgery?*
- ☐ 0 to 5
- ☐ 6 to 10
- ☐ 11 to 20
- ☐ Over 20 years

Do you use arthroscopy in the treatment of foot pathologies?*
- ☐ Yes
- ☐ No

If you answered no, please explain.
- ☐ I do not believe in the method
- ☐ I believe in the method, but I have no cases that present indications
- ☐ I believe in the method, but I did not undergo training to perform it.
- ☐ I believe in the method, but I do not have access to the necessary equipment.

Where did you seek theoretical knowledge in arthroscopy? (more than one answer is allowed)
- ☐ Books
- ☐ Articles
- ☐ Online videos and websites

Where did you undergo training in arthroscopy? (more than one answer is allowed)
- ☐ During fellowship in foot and ankle surgery
- ☐ Accompanying colleagues who are more familiar with the method
- ☐ Courses in Brazil
- ☐ Courses abroad

What type of anesthesia do you use for arthroscopy? (more than one answer is allowed)
- ☐ Locoregional without sedation
- ☐ Locoregional with sedation
- ☐ Spinal anesthesia

Do you use routine tourniquet for arthroscopy?
- ☐ Yes
- ☐ No

What arthroscopic techniques do you usually use? (more than one response is allowed)
- ☐ Anterior ankle arthroscopy
- ☐ Posterior ankle arthroscopy
- ☐ Subtalar arthroscopy
- ☐ First metatarsophalangeal arthroscopy
- ☐ Small joint arthroscopy
- ☐ Tendoscopy

How many arthroscopic surgeries do you usually perform per year?
- ☐ Up to 5
- ☐ 6 to 10
- ☐ 11 to 20
- ☐ 21 to 40
- ☐ Over 40

What pathologies do you usually treat with anterior arthroscopy? (more than one answer is allowed)
- ☐ Bone injury
- ☐ Soft tissue injury
- ☐ Osteochondral lesion
- ☐ Arthritis (tibiotalar arthrosis)
- ☐ Distal tibiofibular syndesmosis injury
- ☐ Chronic instability (ligament reconstruction)
- ☐ Fractures

What material do you routinely use in anterior ankle arthroscopy?
- ☐ 4 mm optics with 30° inclination
- ☐ 2.7 mm or 2.9 mm mini optics
- ☐ 70° optics

What pathologies do you usually treat with posterior arthroscopy? (more than one answer is allowed)
- ☐ Posterior injury
- ☐ Pathologies of the flexor hallucis longus
- ☐ Os trigonum resection
- ☐ Osteochondral lesion of the talus
- ☐ Arthritis (tibiotalar arthrosis)
- ☐ I do not perform posterior arthroscopy

What material do you routinely use in posterior ankle arthroscopy?
- ☐ 4 mm optics with 30° inclination
- ☐ 2.7 mm or 2.9 mm mini optics
- ☐ 70° optics

What pathologies do you usually treat with subtalar arthroscopy? (more than one answer is allowed)
- ☐ Osteochondral lesion
- ☐ Arthritis (subtalar arthrodesis)
- ☐ Tarsal tunnel syndrome
- ☐ Calcaneus fracture
- ☐ Posttraumatic arthrofibrosis
- ☐ Synovitis
- ☐ I do not perform subtalar arthroscopy

What material do you routinely use in subtalar ankle arthroscopy?
- ☐ 4 mm optics with 30° inclination
- ☐ 2.7 mm or 2.9 mm mini optics
- ☐ 70° optics

Regarding radiofrequency in arthroscopies:
- ☐ I find it unnecessary
- ☐ I find it necessary in some cases, but have no access to the material
- ☐ I find it necessary in some cases and have access to the material
- ☐ I use it in all cases

Regarding the use of traction in arthroscopies:
- ☐ I do not apply it
- ☐ I rarely apply it
- ☐ I routinely apply it

What kind of traction do you apply?
- ☐ Noninvasive, attached to the surgeon's body
- ☐ Noninvasive, fixed to the table
- ☐ Invasive

Regarding the use of infusion pump:
- ☐ I find it unnecessary, I use gravitational infusion
- ☐ I use it whenever the material is available
- ☐ I use it in all cases

What complications have you had in arthroscopies? (more than one answer is allowed)
- ☐ Dehiscence
- ☐ Infection
- ☐ Neuropraxia
- ☐ Poor reduction
- ☐ Pseudoarthrosis
- ☐ Synovial fistula

Figure 1. Questionnaire used for data collection.

Data analysis was conducted using the statistical program STATA v14.2 (StataCor, Texas, USA). Quantitative and qualitative descriptions of the answers for each item were included in the results. To compare the percentages obtained in 2017 and 2019, the chi-square test or Fisher's exact test were used. A 95% significance level was adopted.

RESULTS

In total, 75 of 504 members in 2017 and 82 of the 635 members in 2019 completed the survey (response rate of 15% and 13%, respectively). In both years, most participants were from the Southeast region, followed by those from the South (Figure 2). Most associates who responded to the survey had more than 10 years of practice in foot and ankle surgery (Figure 3).

About 40% of interviewees reported learning the technique in foot and ankle fellowship in 2017, increasing to 62% in 2019 ($p = 0.007$). The techniques most used by surgeons were anterior ankle arthroscopy, both in 2017 (59 surgeons, 79%) and in 2019 (73 surgeons, 89%), followed by posterior ankle arthroscopy also in 2017 (41 surgeons, 55%) and in 2019 (55 surgeons, 67%). Figure 4 shows the pathologies most treated with anterior arthroscopy.

The 4 mm optics with 30° inclination were the material most used routinely in anterior ankle arthroscopy in both 2017 and 2019. Table 1 shows a relative increase in the use of 4 mm optics by surgeons ($p = 0.002$).

Figures 5 and 6 show the pathologies most treated with posterior ankle and subtalar arthroscopy. Neuropraxia was the most frequently reported complication: 40 (56%) in 2017 and 41 (51%) in 2019 (Figure 7).

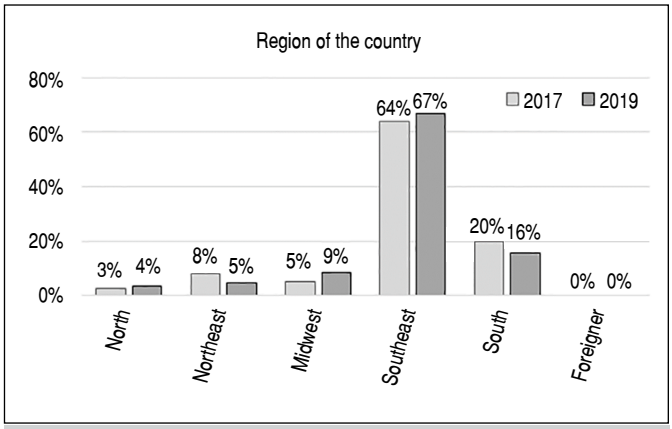

Figure 2. Working region of the participants ($p = 0.786$).

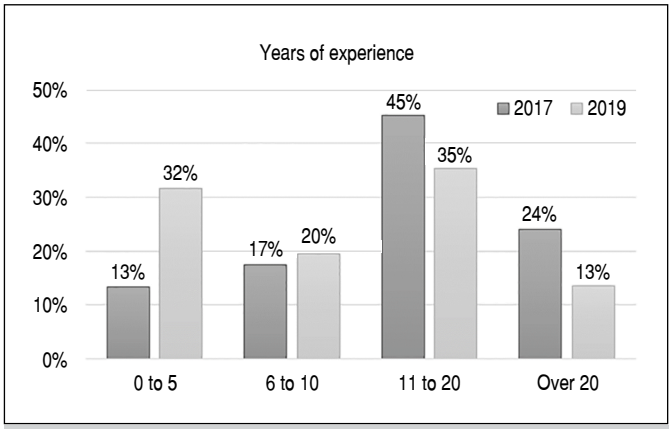

Figure 3. Time of experience in arthroscopy practice ($p = 0.027$).

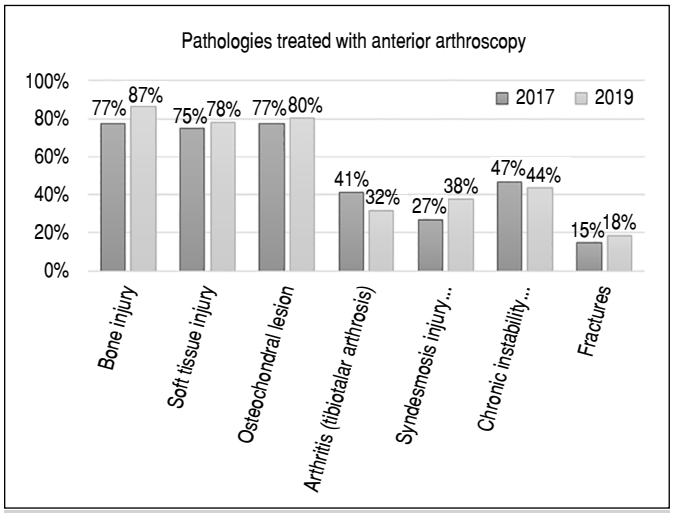

Figure 4. Pathologies most treated with anterior ankle arthroscopy. All items showed no statistically significant difference from 2017 to 2019 and the lowest p-value found was 0.192.

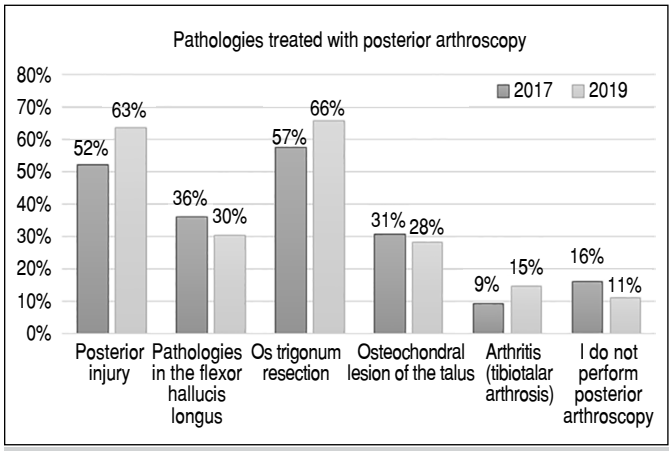

Figure 5. Pathologies most treated with posterior ankle arthroscopy. All items showed no statistically significant difference from 2017 to 2019 and the lowest p-value found was 0.099.

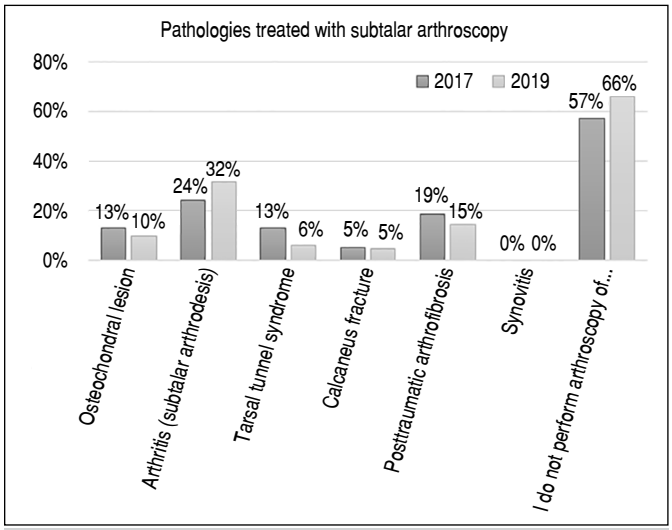

Figure 6. Pathologies most treated with subtalar ankle arthroscopy. All items showed no statistically significant difference from 2017 to 2019 and the lowest p-value found was 0.185.

Table 1. Surgeons' answers about arthroscopy.

Question	Alternatives	2017	2019	p-value
Performs arthroscopy	Yes	75%	83%	0.214
	No	25%	17%	
Reason for not performing arthroscopy	I do not believe in the method	9%	15%	0.379
	I believe in the method, but I have no cases that present indications	18%	0%	
	I believe in the method, but I did not undergo training to perform it	59%	62%	
	I believe in the method, but I have no access to the necessary equipment	14%	23%	
Anesthesia#	Locoregional without sedation	0%	0%	1.000
	Locoregional with sedation	16%	20%	0.435
	Spinal anesthesia	77%	80%	0.435
Tourniquet	Yes	93%	90%	0.548
	No	7%	10%	
Arthroscopic Techniques#	Anterior ankle arthroscopy	79%	89%	0.059
	Posterior ankle arthroscopy	55%	67%	0.076
	Subtalar arthroscopy	32%	33%	0.369
	First metatarsophalangeal arthroscopy	21%	18%	0.390
	Small joint arthroscopy	3%	10%	0.066
	Tendoscopy	28%	27%	0.505
Number of Arthroscopies per year	Up to 5	10%	20%	0.216
	6 to 10	20%	30%	
	11 to 20	29%	24%	
	21 to 40	19%	15%	
	Over 40	22%	11%	
Material used in anterior arthroscopy#	4 mm optics with 30° inclination	55%	70%	0.040*
	2.7 mm or 2.9 mm mini optics	33%	37%	0.398
	70° optics	0%	0%	1.000
Material used in posterior arthroscopy#	4 mm optics with 30° inclination	48%	60%	0.094
	2.7 mm or 2.9 mm mini optics	17%	16%	0.486
	70° optics	0%	0%	1.000
Material used in subtalar arthroscopy#	4 mm optics with 30° inclination	15%	20%	0.278
	2.7 mm or 2.9 mm mini optics	27%	22%	0.307
	70° optics	0%	0%	1.000
Use of radiofrequency	I find it unnecessary	9%	23%	0.002*
	I find it necessary in some cases, but I have no access to the material	14%	16%	
	I find it necessary in some cases and I have access to the material	70%	57%	
	I use it in all cases	7%	4%	
Application of Traction	I do not apply it	33%	40%	0.049*
	I rarely apply it	36%	47%	
	I routinely apply it	31%	13%	
Traction Type#	Noninvasive, attached to the surgeon's body	35%	38%	0.404
	Noninvasive, fixed to the table	27%	22%	0.307
	Invasive	0%	1%	0.522
Use of infusion pump	I find it unnecessary, I use gravitational infusion	24%	18%	0.665
	I use it whenever material is available	36%	42%	
	I use it in all cases	41%	40%	

* statistically significant p-values (< 0.05); # More than one response was allowed for these variables.

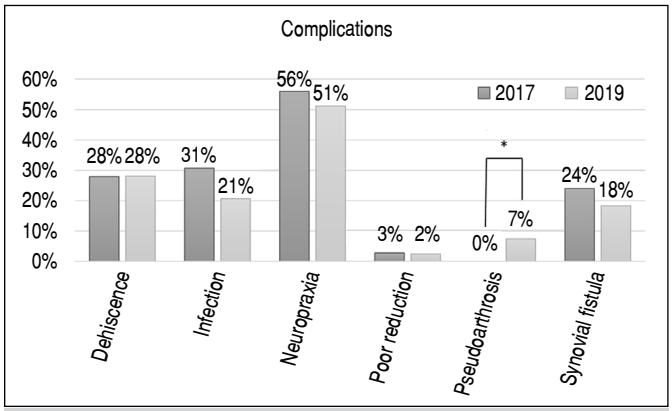

Figure 7. Main complications found in ankle arthroscopy (*p = 0.019). Other differences have no statistical significance.

DISCUSSION

Our study found that arthroscopy was most used by surgeons with 11 to 20 years of experience in both 2017 and 2019. However, the number of surgeons with zero to five years of experience performing this technique increased (p = 0.027). Knowledge of arthroscopic surgery during fellowship in foot and ankle surgery also increased between the two surveys (p = 0.007). Physicians also received training by taking courses in Brazil and abroad or by accompanying colleagues who already practice the technique. Most surgeons in this study believe in the method. Those who do not apply it indicated the lack of adequate training and access to equipment as major limiting factors for adopting the practice. This is the first study to trace the demographic profile of Brazilian surgeons and future studies can use our data to optimize and improve access to knowledge and new technologies.

Most participants were from the Southeast region of the country, with 48 surgeons (64%) in 2017 and 55 (67%) in 2019, followed by the South region, with 15 (20%) and 13 surgeons (16%), respectively. This distribution suggests greater access to arthroscopic technique in these regions, following the proportionality of ABTPé members in the country.

We found no epidemiological surveys on the prevalence of the use of anterior, posterior, or subtalar arthroscopy in Brazil in the literature. We observed that most surgeons who answered the questionnaire reported performing arthroscopic surgery. These data should be analyzed carefully since those who do not practice the technique may have been discouraged to fill out the questionnaire. Among the participants who reported performing arthroscopy, most performed anterior ankle access and few reported subtalar arthroscopy. Anterior arthroscopy is the most frequently performed surgery since it is technically simpler and has more indications than posterior and subtalar access.

The main indications for anterior ankle arthroscopy are bone injury, soft tissue injury, synovitis, loose bodies, osteochondral lesions, lateral ankle ligament repair and reconstruction, and ankle arthrodesis. Our data corroborate those found in the literature, which indicates bone and soft tissue injuries and osteochondral lesions as the main pathologies treated with this access.[3,10]

In their 1989 study, Ferkel and Fischer[11] recommended using mini-optics with 30° inclination. In our research, the most used material was the 4 mm optics with 30° inclination.[12,13] The use of this material increased from 2017 to 2019 (p = 0.04), likely due to the greater availability of the 4 mm optics and dissemination of the philosophy proposed by van Dijk and van Bergen in our country.[12]

The main indications for posterior ankle arthroscopy are osteochondral lesion of the talus, loose bodies, ossicle resection, osteophytes, synovial chondromatosis, arthrodesis, synovitis, and extra-articular structures such as Achilles tendon, flexor hallucis longus, os trigonum, and hypertrophy of the talar beak.[4,14] In 2000, van Dijk, Scholten, and Krips[15] introduced the posterior access with two portals and with patients in prone positioning, allowing

excellent access to the posterior ankle compartment, subtalar joint, and extra-articular structures. In our study, the pathologies most treated with arthroscopy were the os trigonum resection and posterior injury of the ankle, corroborating findings in the literature.[16,17] We also found that most surgeons use 4 mm optics with 30° inclination in posterior endoscopy.

Most Brazilian surgeons prefer to routinely use the tourniquet in arthroscopies, but more recent studies show no significant differences in the use of tourniquet regarding surgical time, joint visualization, and postoperative complications.[18,19]

Most participants consider using radiofrequency in some cases and have access to this feature. However, an increasing number of surgeons no longer uses it ($p = 0.002$), likely because of the high cost and adverse effects of the method, such as thermal lesions and capsular necrosis.[20]

Regarding the use of traction during ankle arthroscopy, most did not apply it or rarely applied it in both surveys. The routine use of this technique also decreased among surgeons ($p = 0.049$). The literature diverges regarding the use of traction, so surgeons should choose the method in which they are most experienced. Guhl[21] was one of the pioneers in developing one of the first traction devices for ankle arthroscopy, in 1988. In his 2016 study, Ferkel[22] analyzed the practice of noninvasive traction in relation to invasive traction.[23] Recently, authors such as Vega and Dalmau-Pastor[24] promoted performing ankle dorsiflexion instead of traction. Regarding the type of traction, our study found that most surgeons used noninvasive traction attached to the surgeon's body. This data is in line with the trend of less invasive procedures.

According to our results, most surgeons choose using infusion pump rather than gravitational infusion. The pump has advantages such as maintaining a constant and consistent flow and presenting a better distension and joint visualization.[25] Limitations to the use of infusion pump could include the lack of access to this material and its high cost compared to gravitational infusion.

The main complications found were neuropraxia, infection, and dehiscence, corroborating the 2013 study by Carlson and Ferkel[26]. In their study, the most frequent complications were neurological lesions, caused in different ways: incorrect access of the arthroscopic portal, prolonged or inappropriate traction, or excessive use of tourniquet. The correct delimitation of the site for the arthroscopic portal is essential to prevent superficial fibular nerve injury.[27]

Email surveys are faster and have an estimated cost of 5 to 20% of the cost of mail surveys. Moreover, answers can be more dependable than in surveys by telephone or mail.[28] We obtained a response rate of 15% and 13% in 2017 and 2019, respectively, comparable to the 20% response rate of postal questionnaires in the literature.[29]

This study presents limitations regarding the number of respondents and the short period (two years) among the surveys. Only the surgeons who perform arthroscopic procedures might have responded to the survey while those who do not were discouraged to participate. However, this is the first survey on the practice of foot and ankle arthroscopic surgery in Brazil and it contains demographic information, technical aspects, and trends of surgeons in Brazil, which can contribute to future studies on the subject. We believe that in a longer period these data will change with the improved practice and experience in arthroscopy among Brazilian orthopedists.

CONCLUSION

Most Brazilian foot and ankle surgeons who participated in the research perform arthroscopic surgery, have more than 10 years of experience in the specialty, usually perform anterior access, and are mainly gathered in the Southeast region of the country. We observed an increase in the number of surgeons with up to five years of experience and who learn the technique during fellowship. We also found a tendency to use 4.0 mm and 30° angulation optics and a decrease in routine traction and radiofrequency use.

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