The Role of the Hand Surgeon in Microsurgery in Brazil*

Atuação do médico cirurgião de mão em microcirurgia no Brasil

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Rev Bras Ortop 2019;54:309–315.

Abstract

Objective This study evaluates the conditions for microvascular procedures found by hand surgeons in Brazilian clinical practices.

Methodology A prospective, observational, and analytical primary clinical research conducted during the 37th Brazilian Congress of Hand Surgery, from March 30th to April 1st, 2017, in Belo Horizonte, in which physicians answered 12 closed, objective, multiple-choice questions regarding their geographic region, type of institution (public or private), microsurgical training, time of experience, technical conditions, the availability of a standby team for emergencies and compensation.

Results The study analyzed 143 hand surgeons; among them, 65.7% participants were based at the Southeast region, 13.3% in the Northeast region, 11.9% in the South region, 6.3% in the Central-West region and 2.8% in the North region. Regarding the time of experience, 43.4% of the hand surgeons had less than 5 years, 16.8% had 5 to 10 years, 23.8% 10 to 20 years, and 23% had more than 20 years of practice in microvascular surgery. Seven percent of the surgeons had no training in microvascular surgery; for 63.6%, training occurred during medical residency, whereas 30.8% were trained in another institution, and 7.7% in another country. Among these surgeons, 76.9% worked at both private and public hospitals, 14.7% at private hospitals and 5.6% at public hospitals. Regarding compensation, 1.8% of the surgeons considered it adequate, and 98.2%, inadequate in public hospitals, whereas 5.0% considered it adequate, and 95.0%, inadequate in private hospitals.

Conclusion This research shows that most surgeons were trained in microsurgery, had never performed reattachments, and considered that compensation is inadequate; moreover, standby teams were not available. There are few, unevenly distributed hand surgeons with microsurgical ability in emergency settings, and their compensation is low.

Keywords
- hands/surgery
- replantation
- microsurgical procedures
- socioeconomic factors

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received
January 21, 2018
accepted
July 2, 2018

DOI https://doi.org/10.1055/s-0039-1692433.
ISSN 0102-3616.

Resumo

Objetivo Avaliar as condições que o Cirurgião de Mão no Brasil tem encontrado na prática clínica para a realização de procedimentos microvasculares.

Métodos Pesquisa clínica primária, prospectiva, observacional, transversal, e analítica; realizada no 37° Congresso Brasileiro de Cirurgia de Mão, de 30 de março a 1° de abril de 2017, em Belo Horizonte, MG, Brasil. Foi aplicado um questionário a médicos do congresso, com 12 perguntas, respostas objetivas, fechadas ou múltipla escolha em relação à região geográfica; tipo de instituição, se pública e/ou privada; seu treinamento microcirúrgico; tempo de formação; condições técnicas; presença de equipe de retaguarda para urgências; e remuneração.

Resultados Cento e quarenta e três médicos foram entrevistados, 65,7% dos quais atuavam na região Sudeste; 13,3% no Nordeste; 11,9% no Sul; 6,3% no Centro Oeste; e 2,8% no Norte. Em relação ao tempo de experiência, 43,4%, atuavam há menos de 5 anos; 16,8% de 5 a 10 anos; 23,8% de 10 a 20 anos; e 23 há mais de 20 anos. Um total de 7,0% não tivera treinamento em cirurgias microvasculares; 63,6% realizaram treinamento na residência médica, 30,8% em outra instituição, e 7,7%, outro país. Dentre os cirurgiões entrevistados, 5,6% trabalhavam em hospitais públicos, 14,7% em hospitais privados, e 76,9% em ambos. Quanto à compensação, 1,8% consideravam adequada a remuneração nas instituições públicas, e 5,0% nas instituições privadas, enquanto que 98,2% consideraram inadequadas nas públicas, e 95,0% nas privadas.

Conclusão Esta pesquisa demonstra que a maioria dos cirurgiões entrevistados obteve treinamento em microcirurgia; nunca fez reimplantes, e considera a remuneração inadequada; além do mais, não existe disponibilidade de equipe de sobreaviso. Há escassez e má distribuição de cirurgiões de mão com habilidade microcirúrgica nas emergências, e baixo valor de remuneração.

Palavras-chave

- mãos/cirurgia
- reimplante
- procedimentos microcirúrgicos
- fatores socioeconômicos

Introduction

The hand is the part of the body that is most exposed to trauma.[1,2] Traumatic hand and wrist injuries are among the main causes for emergency room visits worldwide.[2] There are no data regarding the number of such visits in Brazil. Epidemiological knowledge and the identification of the population susceptible to this type of trauma can assure an effective initial care for the functional recovery of the hand. The inadequate management of this type of patient creates an important cost to both the individual and the health and social security system. It is known that, in the absence of adequate local technical conditions, the patient must be transferred to a referral center with adequate equipment and a qualified medical staff.[3]

Severe injuries require the intervention of a well-trained hand surgery team within an ideal time frame to increase success rates.[4,5]

Sometimes, this intervention requires knowledge and training in microsurgical techniques. Today, microsurgical techniques are no longer limited only to the treatment of acute traumatic injuries and limb amputations, they also encompass reconstructive procedures, such as microsurgical flaps.[6]

The rationale for this research is that the good reattachment or microsurgical flap outcome depends on several factors, including patient and lesion features, the availability of proper instruments and a surgical microscope, the skill and training of the surgeon, and a well-trained hospital staff.[6,7]

Even in the most economically developed countries, microvascular procedures performed by specialist physicians are restricted to trauma centers, university hospitals, and tertiary care hospitals.[8]

The objective of this research was to evaluate the conditions found by Brazilian hand surgeons performing microvascular procedures at a clinical practice.

Material and Methods

This clinical research was performed by applying a questionnaire to physicians participating in the 37th Brazilian Congress of Hand Surgery, in Belo Horizonte, Brazil, between March 30th and April 1st, 2017.

This was a prospective, observational, cross-sectional, and analytic primary clinical research.[9] The questionnaire consisted of 12 easy-to-understand questions with closed-type objective answers to increase the response rate, as shown in ►**Fig. 1**.

The collected data included the Brazilian geographic region where the surgeon worked, his/her institution type (public and/or private), microsurgical training during medical residency, experience time, microvascular procedures performed, presence of proper technical conditions, availability of a standby team for urgent cases, and opinions about compensation.

The anonymity of the participants was emphasized to minimize bias.

QUESTIONNAIRE

The Role of the Hand Surgeon in Microsurgery in Brazil

1. **In which region do you work?**

   ( ) South ( ) Southeast ( ) North

   ( ) Northeast ( ) Central-west

2. **How long have you been performing hand surgeries as a specialist?**

   ( ) up to 5 years ( ) 5–10 years

   ( ) 10–20 years ( ) over 20 years

3. **Do you work in a public and/or private practice?**

   ( ) Public ( ) Private ( ) Public and Private

4. **How was your training on microvascular procedures?**

   ( ) There was no training ( ) At the current institution

   ( ) In another country ( ) In another institution

   If yes, please answer:

5. **Do you perform limb reattachment at your facility?**

   Public hospital ( ) Yes ( ) No

   Private hospital ( ) Yes ( ) No

6. **Do you perform microsurgical flaps at your facility?**

   Public hospital ( ) Yes ( ) No

   Private hospital ( ) Yes ( ) No

7. **Are these same procedures performed by other teams/specialists?**

   Reattachment ( ) Yes ( ) No

   Microsurgical flap ( ) Yes ( ) No

   Regarding the institutions you work with, please answer.

8. **Are there a microscopy, instruments and adequate sutures to perform reattachments and microsurgical flaps?**

   Public hospital ( ) Yes ( ) No

   Private hospital ( ) Yes ( ) No

9. **Is there a reattachment standby team available?**

   Public hospital ( ) Yes ( ) No

   Private hospital ( ) Yes ( ) No

   If yes, please answer:

10. **Are the residual limbs for reattachment properly conditioned?**

    ( ) Yes ( ) No

11. **And in a timely manner?**

    ( ) Yes ( ) No

12. **Do you think the compensation tables for reattachment are adequate according to your region?**

    Public hospital ( ) Yes ( ) No

    Private hospital ( ) Yes ( ) No

Fig. 1 Questionnaire: Practice of the Hand Surgeon in Microsurgery in Brazil.

This work was approved by the Ethics and Research Commission and the Brazil Platform under CAAE number 70235417.3.0000.5442.

The response data were submitted to statistical analysis using the SPSS Statistics for Windows Version 20.0 (IBM Corp., Armond, NY, USA), Minitab 16 (Minitab LLC, State College, PA, USA) and Microsoft Excel 2010 software (Microsoft Corp., Redmond, WA, USA) to calculate the equality test of two proportions to characterize the relative frequency distribution in all questions.

The significance level was defined as 0.05 (5%). All confidence intervals constructed throughout this work were within a 95% percentile.

Statistical analysis characterized the relative frequency distribution (percentages) of all questions in the questionnaire using the equality test of two proportions.

Results

A total of 143 hand surgeons answered the questionnaire. Among them, 94 (65.7%) worked in the Southeast region (19%), 19 (13.3%) in the Northeast region, 17 (11.9%), in the South region, 9 (6.3%) in the Central West region, and 4 (2.8%) in the North region; there was no statistically significant difference, with $p < 0.001$ (►**Table 1**), in question 1 answers.

Table 1 Regional distribution of the evaluated physicians

1–Place of work	N	%	*P*-value
Central-West	9	6.3%	< 0.001
Northeast	19	13.3%	< 0.001
North	4	2.8%	< 0.001
Southeast	94	65.7%	Ref.
South	17	11.9%	< 0.001
Total	143		

Regarding experience time, 62 (43.4%) had less than 5 years, 24 (16.8%) had 5 to 10 years, 34 (23.8%) had 10 to 20 years and 23 (16.1%) had more than 20 years. No statistical significance was found, with $p < 0.001$, in question 2 answers.

Regarding hospital management, 8 (5.6%) surgeons worked only in public hospitals, 21 (14.7%) only in private hospitals and 110 (76.9%) in both public and private institutions. There were no significant differences, with $p < 0.001$, in question 3 answers.

During medical residency in hand surgery, 10 (7.0%) professionals had no training in microvascular procedures, 91 (63.6%) underwent training at the medical residency service, 44 (30.8%) were trained in another institution and 11 (7.7%) in another country. There were no significant differences, with $p < 0.001$, in question 4 answers.

At public hospitals, 45 (34.9%) surgeons performed limb reattachments, and 44 (65.1%) did not. At private hospitals, 57 (45.6%) surgeons performed limb reattachments, and 68 (54.4%) did not (►**Fig. 2**). However, this difference in question 5 answers was not statistically significant.

In public hospitals, 80 (63.0%) surgeons performed microsurgical flaps, and 47 (37.0%) did not. In private hospitals, 75 surgeons (58.6%) performed microsurgical flaps, and 54 (41.4%) did not. This difference in question 6 answers had no statistical significance.

According to 34 surgeons (27.4%), there are specialists other than hand surgeons who perform reattachments; 90 (72.6%) surgeons, however, stated that reattachments are not performed by other specialists. As for flaps, 68 (50.4%) surgeons answered that these procedures are performed by other specialists, while 67 (49.6%) declared the opposite. This difference in question 7 answers had no statistical significance.

Of the surgeons working in public hospitals, 84 (66.1%) stated that they had a microscope in addition to instruments and sutures suitable for microsurgery, while 43 (33.9%) declared that they did not have the proper technical conditions to perform such procedures. Among surgeons working in private hospitals, 117 (80.1%) reported that these materials are adequate, while 29 (19.9%) disagree. There were no statistically significant differences in question 8 answers.

Regarding the availability of a standby reattachment team, 22 (19.0%) surgeons confirmed it, while 94 (81.0%) reported it as lacking in public hospitals. In private hospitals, 35 (26.5%) surgeons answered that there is a standby team, and 97 (73.5%) said that there is not. There were no statistically significant differences in question 9 answers.

Regarding the conditioning conditions in which amputated fingers arrived at hospital, 38 (36.9%) surgeons said that they were adequate, and 65 (63.1%) said that they were inadequate. There were no statistically significant differences in question 10 answers.

As to the time in which amputated fingers arrived at the hospital in viable conditions, 53 (53.0%) surgeons answered that it was adequate, while 47 (47.0%) said it was not. This difference in question 11 answers, however, had no statistical significance.

Regarding compensation according to their region of work, 2 (1.8%) surgeons considered it adequate in public institutions, and 6 (5.0%) in private hospitals, while 112 (98.2%) considered it inadequate in both public and private institutions, and 114 (95.0%) considered it inadequate in private hospitals, but this difference had no statistical significance.

Discussion

Researches commonly assess the use and outcome of new clinical practices for disease treatment. Their data can

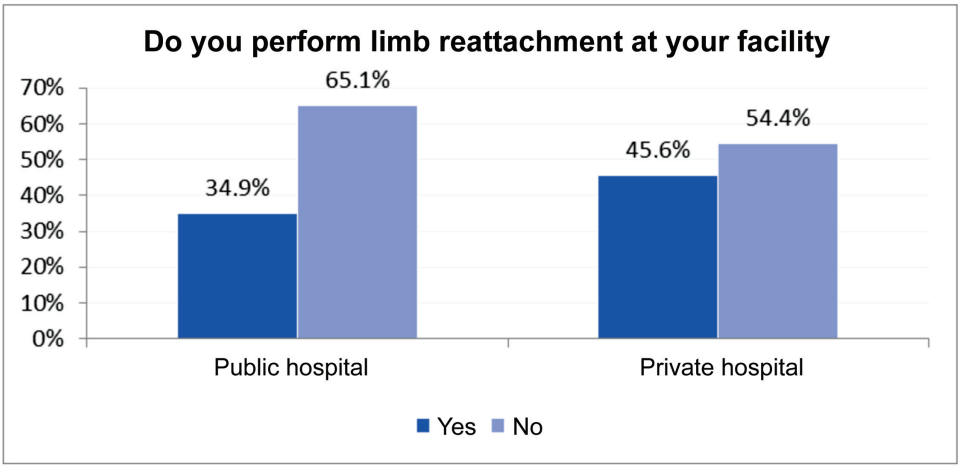

Fig. 2 Limb reattachment.

influence collective health policies and help to construct protocols.[9]

The questionnaire is a data collection tool consisting in an ordered series of questions, which must be answered in writing and without the presence of the interviewer. This research was conducted using an anonymous questionnaire printed during a national hand surgery congress, composed of 12 easy-to-understand questions with multiple choice answers. Not all participants answered the questionnaire, mainly because it was difficult to access them in a large place; a minority had no interest in answering it after the topic was presented.

No article with this same methodology to evaluate the performance of microsurgical techniques by hand surgeons was found in the literature survey.

Regarding this same subject, three papers using an electronic questionnaire as a research methodology were found; their response rate ranged between 18.5 and 45%.[7,8,10] Two papers used telephone research, with response rates ranging from 85 to 86%.[11] In one study, the authors used an electronic format and, if the physicians could not answer it, contact was made by telephone. This led to a response rate of 100%, but with a target audience much smaller than in previous studies.[6]

The highest response rate in this questionnaire was obtained with surgeons with less than 5 years of experience. Our results were different from those found in the literature, in which the active majority of the surgeons had 9 to 20 years of experience.[12,13]

As in other countries, the geographical disposition of the physicians interviewed was similar to the populational proportion per region, with the majority in the Southeast region, followed by the Northeast region, the two most populous regions in Brazil.[14]

According to the questionnaire, 76.9% of the surgeons worked in both private and public hospitals, 14.7% in private hospitals only, and 5.6% in public hospitals only. Although the health care systems are different in Brazil and in the United States, studies with members of the American Society of Hand Surgery showed that most surgeons also work in private institutions, with 48.4% in private hospitals with no academic links, and 18.8% in hospitals with academic affiliation.[7,10]

In a research performed in American institutions registered as references in microvascular procedures, 47% of level I trauma centers had immediate access to the hand surgeon, and the reattachment possibility was continuous and definitive. When level II trauma centers were analyzed, however, this rate fell to 29%.[11]

The highest response rate in this questionnaire was obtained with surgeons with less than 5 years of experience. Our results were different from those found in the literature, in which the active majority of the surgeons had 9 to 20 years of experience.[12,13]

Most respondents in this survey were trained during medical residency; only 7% of the hand surgeons reported not having such training.

Continuous proper training can improve microsurgical techniques regardless of the underlying specialty.[15]

In the United States, although 70% of the surgeons considered their training in microsurgery during residency as excellent, most decided not to perform reattachments. The justifications included: having theirs schedules occupied by elective procedures and clinical practice (51%), loss of confidence in their surgical ability (39%) and low financial compensation for a long, highly complex procedure (30%).[7,8,16]

We believe that our results show that this trend is repeated in Brazil, since most surgeons answered that they do not perform reattachments, especially in the public setting, in which a statistical significance was found.

Regarding microsurgical flap procedures, the response rate was positive in 63% of the surgeons from public institutions. Although the literature states that microsurgical flaps are still economically viable at private practices, there was no difference between the proportion of surgeons performing these procedures or not in the private network.[17]

Although most of the interviewed surgeons had training in microsurgery, including in microsurgical flaps, this does not seem to be reflected in the professional practice. These results were similar to the US findings, in which 94% of surgeons declared that microsurgical procedures represent less than 25% of their practice.[8,18]

This research observed that 50.4% of the surgeons from other specialties performed flap procedures compared to hand surgeons, but this difference was not statistically significant.

In the United States, it is reported that hand surgeons who first took up residency in plastic surgery were more likely to perform general microvascular procedures, reattachments and free flaps than surgeons trained in orthopedic residency.[7,10] Nevertheless, the frequency of microvascular procedures among plastic surgeons in the United States has been decreasing, mainly due to the low financial compensation.[19]

Regarding the availability of a reattachment team in Brazilian hospitals, we observed an absence of 81% in the public network, and 73.5% in the private network.

American literary data on the institutional factors related to the management of hand trauma patients points to failures, such as a shortage of trained specialists to perform emergency care at accident sites and the lack of protocols to guide the real need for larger referral centers.[20]

More than 95% of the surgeons considered that the compensation table for microsurgical procedures is inadequate; this is one of the factors that can explain the discouragement in performing such procedures, as in the United States.[7,8]

Microsurgery training is part of the medical residency programs syllabus for hand surgery specialization.[20–27] However, we must ask ourselves if this training is enough for a good practice and if the substrate given to the physician during training is sufficient for the proper, safe performance of such procedures after graduation.

The lack of a good base is a strong predictor for not practicing the specialty to its fullest.[7]

In our study, most participants, both from public and private institutions, answered that, like other professionals, they do not perform reattachments, unlike microsurgical

flaps, which most hand surgeons and other specialists declared they do.

Although traumatic hand and wrist injuries account for a large number of emergency room visits, 81% of the surgeons from the public network and 73.5% from the private network said that there was no standby team for reattachment, despite the fact that most hospitals had adequate materials and equipment, and only 7% of those interviewed did not have microsurgical training.

There is evidence that the number of reattachments has been decreasing over the last 10 years, reflecting a better qualification of the surgeon to select and better indicate such procedures, and the reduction of amputation cases due to the improvement of the safety measures implemented at the workplace, where most traumatic hand lesions occur.[8,16]

Factors such as low financial compensation, time consumption, absence of qualified colleagues to assist during surgery, lack of a skilled nursing staff for correct postoperative management, and increasing legal medical implications are some aspects described as limitations in the literature.[6,8,19,27]

To maintain the refinement of the microsurgical technique, which is crucial to a satisfactory outcome, the surgeon needs to practice consistently. However, educational, financial, and practical factors do not seem to cooperate.

The costs of laboratory training are burdensome and require a high workload;[15] in addition, microvascular procedures are often time-consuming, and many surgeons do not have this time, either because of elective surgeries or because they believe that it does not contribute to a good quality of life.

More than 95% of the surgeons considered that the compensation table for microsurgical procedures is inadequate; this is one of the factors that can explain the discouragement in performing such procedures.

Most respondents had training during residency, while some performed more than one course at another institution or another country. However, this high training rate does not seem to influence the clinical practice.

Traumatic hand lesions are time-sensitive and require highly specialized care in order to ensure not only single-digit salvage, but also its functionality.[20,21,27] As such, in case of early misconduct, the procedure is doomed to failure, causing problems to both the patient and the health system, since this person will not be able to work for an extended period of time, requiring more interventions and rehabilitations to obtain a minimally satisfactory result; otherwise, the patient will possibly be permanently disabled.[11,16,23]

Although there was no statistical significance, meaning that there was no statistical difference between the comparisons, these are not canceled; the authors suggest that further research may be carried out in other congresses, study groups and national seminars on hand surgery with other specialist groups in order to obtain safer results according to the questions analyzed.

Conclusion

The geographical distribution of hand surgeons in Brazil was proportional to the population density by region, with specialists concentrated in the most populous ones. Most of the surgeons were trained in microsurgery, work in both public and private hospitals, perform microsurgical flaps, but not reattachments, and consider that compensation is inadequate.

There are no other specialties performing reattachments, and most hospitals do not have a standby reattachment team, despite the availability of adequate materials.

There is much room for improvement in view of the decreasing trends for reattachment and microvascular procedures due to scarcity and poor distribution of hand surgeons with microsurgical ability in emergency rooms and the low compensation values.

Conflicts of Interest

The authors declare that there is no conflict of interest.

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