

# Variation among Argentinean orthopedic surgeons in the therapeutic indications for rotator cuff tears

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## ABSTRACT

**Introduction:** Indications in the operative and nonoperative treatment of rotator cuff tears are widely discussed and not standardized. The aim of this study is to evaluate the variability among Argentinean orthopedic surgeons regarding the indications of treatment for different rotator cuff injuries. **Materials and Methods:** A questionnaire was developed based on the study carried out by Dunn *et al.* Our aim was to gather the opinions of Argentinean orthopedic surgeons on decision-making concerning the treatment of different rotator cuff lesions. The questionnaire was sent to 2 groups: general orthopedic surgeons and shoulder specialist surgeons, included according to the number of shoulders treated surgically and non-surgically in 2017. The questionnaire has two sections: 4 hypothetical clinical cases and 11 questions on factors that could influence treatment selection. **Results:** Out of 556 questionnaires sent, 162 were completed, 117 by general orthopedic surgeons and 45 by shoulder specialists. The specialists reported mostly arthroscopic repairs (60%), general orthopedic surgeons reported repairing these injuries mainly by mini-open or by standard open technique (49% and 22% respectively). The failure rate was considered to be 20%, not evidencing differences between professionals ( $P=0.42$ ). There was also agreement in the contraindication of the use of corticosteroids before surgery ( $P=0.74$ ). **Conclusion:** This study evidences significant variability in the management of these patients (for which we selected potentially controversial injuries), making it difficult to establish protocols or consensus guidelines to help standardize treatments for these injuries.

**Key words:** Rotator cuff; tear; treatment; indications.

**Level of evidence:** IIb

## Indicaciones de tratamiento en lesiones del manguito rotador: variación entre cirujanos ortopédicos

## RESUMEN

**Introducción:** Aún se discuten ampliamente las indicaciones terapéuticas (tratamiento quirúrgico y no quirúrgico) para las lesiones del manguito rotador. El objetivo de este estudio fue evaluar la variabilidad entre cirujanos ortopédicos argentinos respecto de las indicaciones de tratamiento para diferentes lesiones del manguito rotador. **Materiales y Métodos:** Se diseñó un cuestionario basado en el estudio de Dunn y cols. para recopilar las opiniones de cirujanos ortopedistas sobre la decisión del tratamiento para lesiones del manguito rotador. El cuestionario se distribuyó a 2 grupos, cirujanos traumatólogos y especialistas en hombro, tomando las indicaciones dadas durante 2017, tanto de tratamiento quirúrgico como de no quirúrgico. El cuestionario constaba de 2 secciones: 4 casos clínicos hipotéticos y 11 preguntas sobre factores que pueden influir en la toma de decisiones por parte del cirujano. **Resultados:** Se enviaron 556 cuestionarios, 117 traumatólogos y 45 especialistas lo respondieron. Los especialistas comunicaron realizar, en su mayoría, reparaciones artroscópicas (60%) y los traumatólogos, reparaciones por técnica abierta con pequeños abordajes (49%) y método abierto convencional (22%). El porcentaje de fracaso estimado en pacientes sometidos a reparación del manguito rotador es del 20%, sin diferencias entre los profesionales ( $p = 0,42$ ). Ambos grupos reportaron opiniones semejantes ( $p = 0,74$ ) en relación con la contraindicación del uso de corticoides en posibles candidatos quirúrgicos. **Conclusión:** Se observó una variabilidad considerable en las indicaciones de tratamiento y manejo de estos pacientes en gran parte de los casos presentados de lesiones potencialmente controvertidas, esto dificulta establecer protocolos o consensuar guías que ayuden a estandarizar tratamientos de elección para estas lesiones.

**Palabras clave:** Manguito rotador; lesión; tratamiento; indicaciones.

**Nivel de Evidencia:** IIb

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## INTRODUCTION

Although there is a good amount of literature on the rotator cuff injury treatment, surgical indications remain widely controversial and have not been standardized.<sup>1</sup> In order to thoroughly define the indications for treatment of rotator cuff tears, the risks and benefits of both operative and nonoperative treatment must be fully examined. The basis for an organized approach to treating rotator cuff tears is grounded in decreasing of risk for chronic rotator cuff changes associated with nonoperative treatment, and establishing the potential for healing of partial-thickness and full-thickness tears, the reparability of tears, and the prognostic factors associated with functional outcomes after treatment.<sup>2</sup> Such factors include gender, smoking habits, previous steroid injections, history of trauma, the grade of osteoarthritis, muscle fatty infiltration, tear size, and the surgical technique.<sup>3</sup>

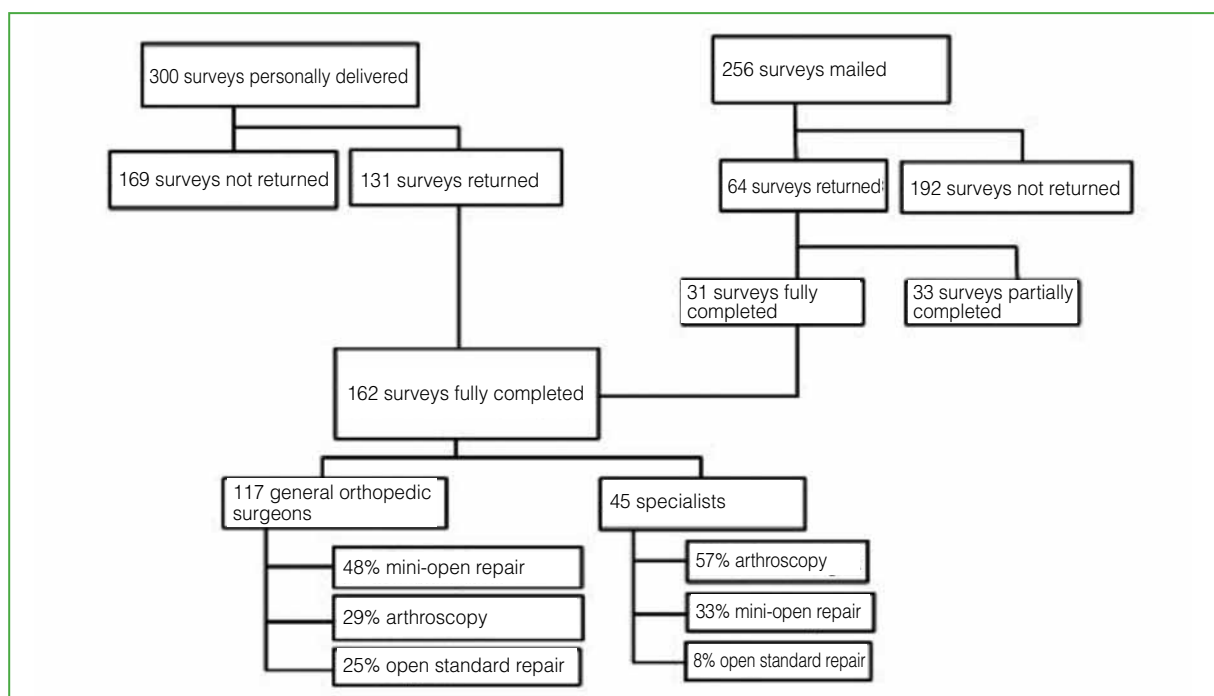
Current literature reports evidence that direct repair of tendon, either by arthroscopy, by mini-open repair or by standard open repair, is the standard treatment indication for high-demand patients.<sup>2,4,5</sup> In older patients with loss of muscle integrity, muscular atrophy and poor tendon quality, the indication for the ideal treatment is more controversial.<sup>2,6,7</sup> The reported outcomes for the surgical repairs of rotator cuff tears are heterogeneous and have a high failure rate.<sup>8-15</sup>

The aim of this study is to evaluate the variability among Argentinean orthopedic surgeons regarding the indications of treatment in different rotator cuff injuries.

We consider that regulation standardizing long-term follow-ups for these patients and a national registry allowing for a reliable statistical analysis of the therapeutic practices undertaken nation-wide, would be a key step for the development, in the near future, of prospective statistical analyses that may improve the indication management for these injuries.

## MATERIALS AND METHODS

Based on the study of Dunn *et al.*,<sup>1</sup> a questionnaire was developed to gather the opinions of Argentinean orthopedic surgeons on decision-making concerning the treatment of different rotator cuff lesions (Appendix). The questionnaire has two sections: the first part poses 4 hypothetical clinical cases, and the second part has 11 questions on factors that could influence surgical decision-making. Questionnaires were delivered through two methods: 1) personally delivered to be completed at the 54th Argentine Congress of Orthopedics and Traumatology, which took place from December 2nd to 6th, 2017, in Buenos Aires; and 2) delivered via email to shoulder specialist and general orthopedic surgeons (Figure 1).



**Figure 1.** Schematic of the delivered surveys

We considered as shoulder specialist surgeons those surgeons who reported 40 or more rotator cuff repairs (RCR) per year, and as general orthopedic surgeons those surgeons with an arthroscopy subspecialty. The surgical volume was determined based on Dunn *et al.*<sup>1</sup> study, including the surgeons with a high-volume of repairs per year according to their tertile distribution analysis.

All surgeons were interviewed and inquired on the number of RCRs performed in 2017 and the chosen procedure (arthroscopic, mini-open or standard open repair) to repair rotator cuff tears of up to 2cm. Additionally, surgeons were asked to estimate the failure rate for all patients undergoing RCR in Argentina.

The case presentations, which stated that the rotator cuff tear had been confirmed by MRI imaging, were designed to address four different potentially controversial clinical presentations. They included: 1) a 50% thickness rotator cuff tear in a patient who had sustained a traumatic injury four months previously; 2) a full-thickness tear in a patient with external rotator weakness and little pain who had sustained a traumatic injury with a three-month evolution; 3) a full-thickness tear in a 55-year-old man with a 1-year history of mild discomfort, and 4) a large, retracted tear with fatty infiltration of the cuff muscles in a patient who had sustained a traumatic injury one week previously and who, at presentation, had functional impairment. For each of the four hypothetical patients, the surgeons were asked to choose one of the following options: 1) physical therapy; 2) a corticosteroid injection; 3) a corticosteroid injection plus physical therapy; 4) surgery with RCR; and 5) surgery without RCR.

Of the eleven questions about factors that might influence decision-making regarding rotator cuff surgery (e.g., patient expectations, role of physical therapy, role of corticosteroid injection, relationship between cuff disease and shoulder osteoarthritis, and potential progression of the tear), nine were answered with the use of a 5-point Likert scale (strongly disagree, disagree, indifferent, agree, and strongly agree). Of the remaining two questions, one requested a numerical response concerning the maximum recommended number of corticosteroid injections, and the other was a multiple-choice question that addressed factors affecting the patients' ability to participate in surgical decision-making.

For the statistical analyses of the collected data, first, an exploratory analysis was performed (measures, summaries, descriptive graphs), and the chi-square test was used to identify associations between variables and central tendency measures in order to describe the variables under study. In addition, we set an alpha significance level of 0.01 and  $P < 0.01$  to be considered statistically significant.

## RESULTS

Out of the 162 completed and returned surveys, 27.7% belonged to the specialist group, and the remaining 72.3% belonged to the general orthopedic group. [Table 1](#) shows both groups' distribution in terms of the preferred type of RCR.

**Table 1.** Distribution in terms of preferred type of rotator cuff repair

Professional	Type of repair			Total
	Arthroscopy	Mini-open repair technique	Open standard repair technique	
Shoulder specialist	26 (57.78)	15 (33.3)	8 (8.89)	45
General orthopedic surgeon	35 (29.91)	57 (48.72)	25 (21.37)	117

The brackets show the percentage according to the professional category.

The shoulder specialists reported an average repair volume of 100 (standard deviation=34), and 10% of them had performed more than 275 repairs. The general orthopedic surgeons, with significantly fewer repairs, reported an average repair volume of 8 (standard deviation=5), and percentile 25 of 1 and percentile 74 of 15. In terms of the type of repair, the annual distributions were significantly different between both groups ([Table 2](#)).

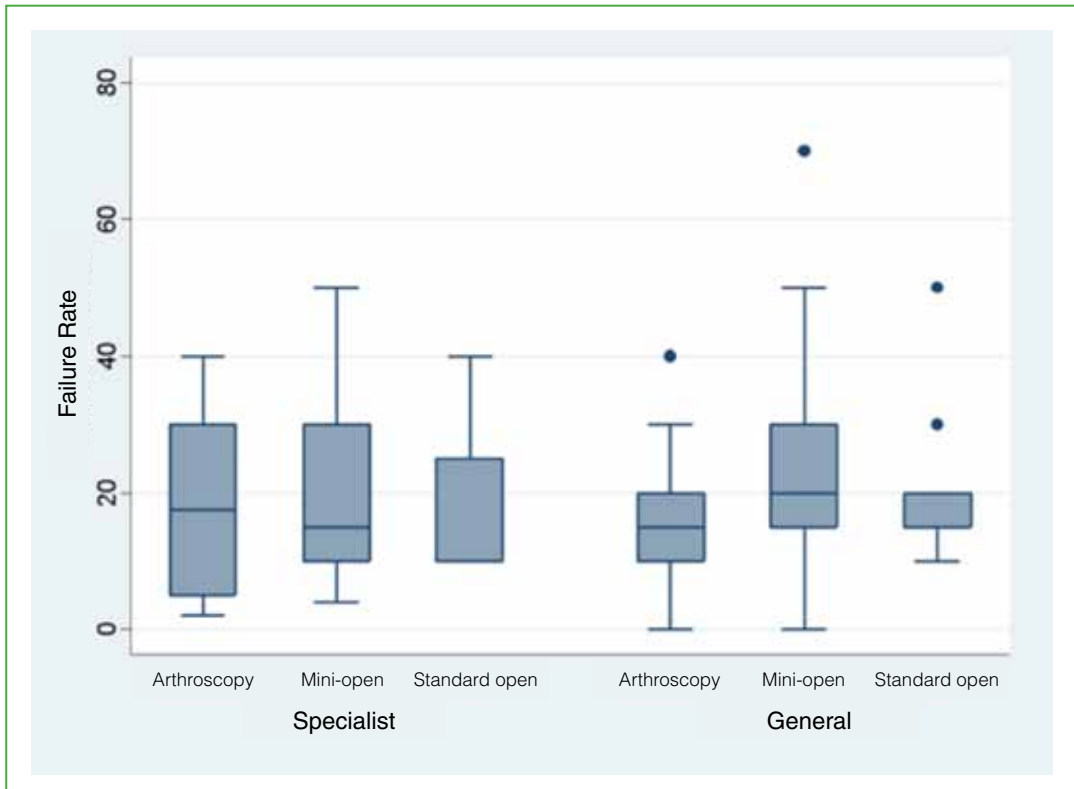
**Table 2.** Surgical annual volume according to each professional category

Type of repair	Shoulder specialist		
	Mean	Percentile 25	Percentile 95
Arthroscopy	131	40	700
Mini-open repair technique	61	40	100
Open standard repair technique	53	45	70
General orthopedic surgeon			
Arthroscopy	9	2	30
Mini-open repair technique	12	3	30
Open standard repair technique	6	2	20

The distribution in terms of the preferred repair (arthroscopic or open) was associated with the group categories ( $P=0.004$ ): most of the shoulder specialists reported they preferred arthroscopies (60%) while the general orthopedic surgeons reported mini-open repair (49%) and open standard repair (22%). Overall, the respondents considered that the failure rate for all patients undergoing RCR is 20%, not evidencing differences between professionals ( $P=0.42$ ). According to the preferred type of repair, the sub-group of general orthopedic surgeons who preferred the mini-open repair considered the highest rate of failure associated with the RCR (Table 3) (Figure 2).

**Table 3.** Failure rate as estimated by the respondents (standard error) according to the type of repair and the professional involved

Type of repair	Professional	Mean	Standard error
Arthroscopy	Shoulder specialist	18.46	2.47
	General orthopedic surgeon	15.68	1.69
Mini-open repair technique	Shoulder specialist	18.93	3.46
	General orthopedic surgeon	25.08	2.0
Open standard repair technique	Shoulder specialist	17.50	2.5
	General orthopedic surgeon	20.11	2.1



**Figure 2.** Box plot of the failure rate according to the type of repair and the professional involved.

Regarding the analyzed clinical cases, by and large, the general orthopedic surgeons and the shoulder specialists differ in defining the therapeutic procedures, particularly for cases 2, 3 and 4. [Table 4](#) shows the answer rate for each indication, and [Figure 3](#) displays, for each clinical case, the trends towards the prescribed procedures of both groups separately.

**Table 4.** Procedure indication rate for each hypothetical clinical case

Case	Professional	Physical therapy	Corticosteroid	Surgery with cuff repair	Surgery without cuff repair	Corticosteroid + Physical therapy
1	Shoulder specialist	2.6	0	73	0	24.4
	General orthopedic surgeon	7	2	70.3	2.22	18.5
2	Shoulder specialist	20	0	77.8	0	2.2
	General orthopedic surgeon	23.7	0	68.1	2.2	6
3	Shoulder specialist	51.1	0	33.3	2.3	13.3
	General orthopedic surgeon	60.8	0	17.6	0	21.50
4	Shoulder specialist	21.1	0	50	11	17.9
	General orthopedic surgeon	23	1,5	50	7	18,5

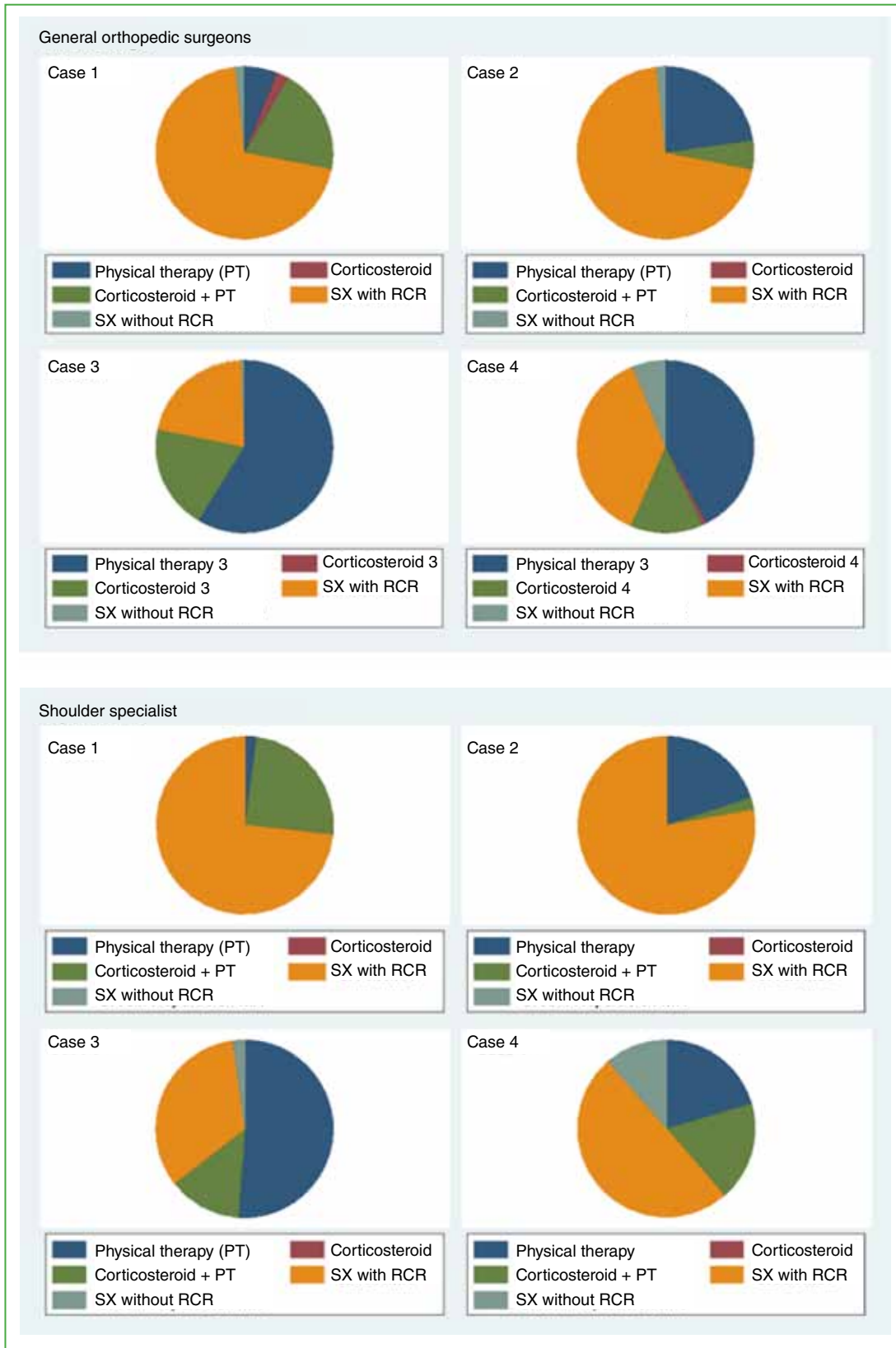
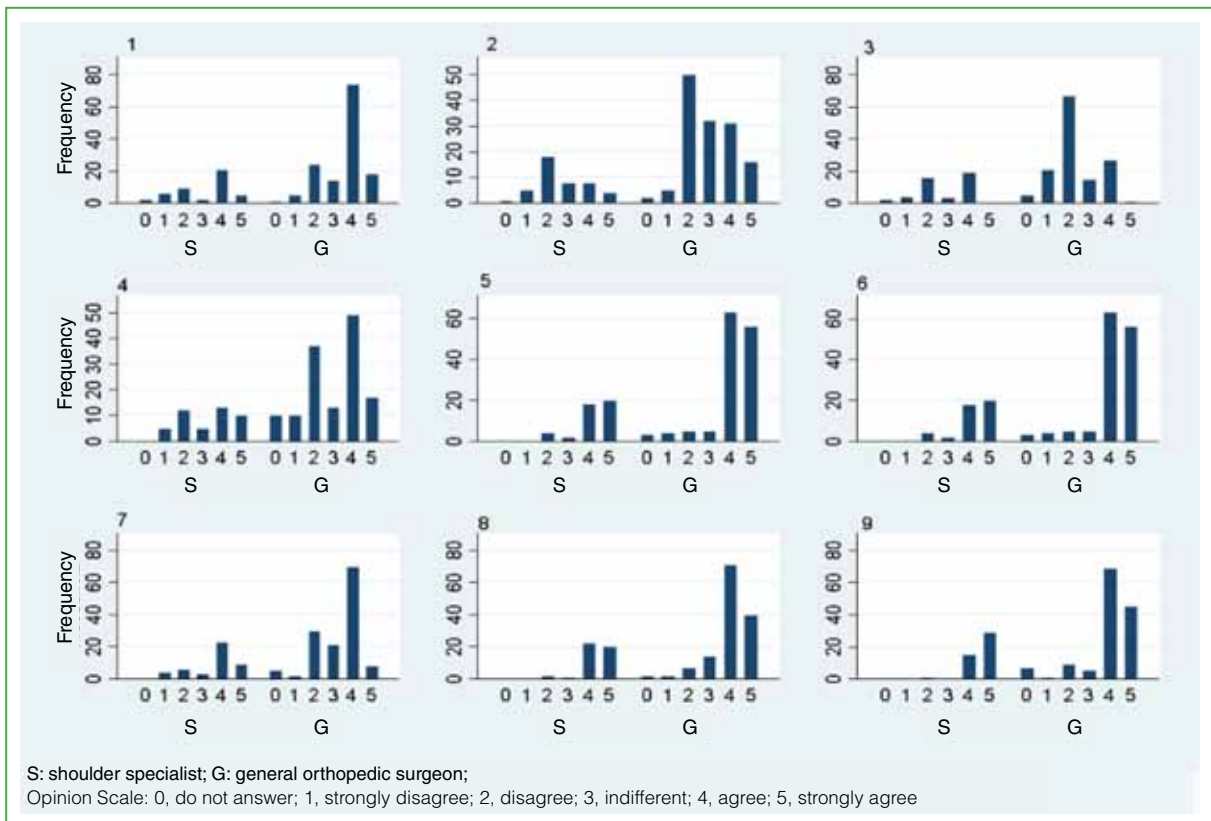


Figure 3. Therapeutic indication distribution for all the hypothetical clinical cases.

Below, we describe the trends of the answers to questions 5-13, of the second section of the survey (Figure 4). In relation to question 5, the opinions of both groups differ ( $P=0.058$ ), and the shoulder specialists answered more homogeneously than the general orthopedic surgeons. In relation to the contraindication for corticosteroid injections used in potential surgical candidates, both groups had similar opinions ( $P=0.74$ ) (Figure 4 shows this same pattern of opinions). In relation to the statement posing that patients should expect to achieve “normal” shoulder after the RCR (question 7), the general orthopedic surgeons expressed greater disagreement than the shoulder specialists ( $P=0.059$ ). This response pattern was also observed for questions 8 and 9, for which both groups had similar answers ( $P=0.642$  and  $P=0.871$ , respectively). In relation to question 10, the opinions distributions of both groups were not homogeneous ( $P=0.003$ ). In question 11, both groups showed their agreement in a homogeneous distribution ( $P=0.27$ ). Answers to questions 12 and 13 presented greater correlation among the shoulder specialists than among the general orthopedic surgeons ( $P=0.07$ ).

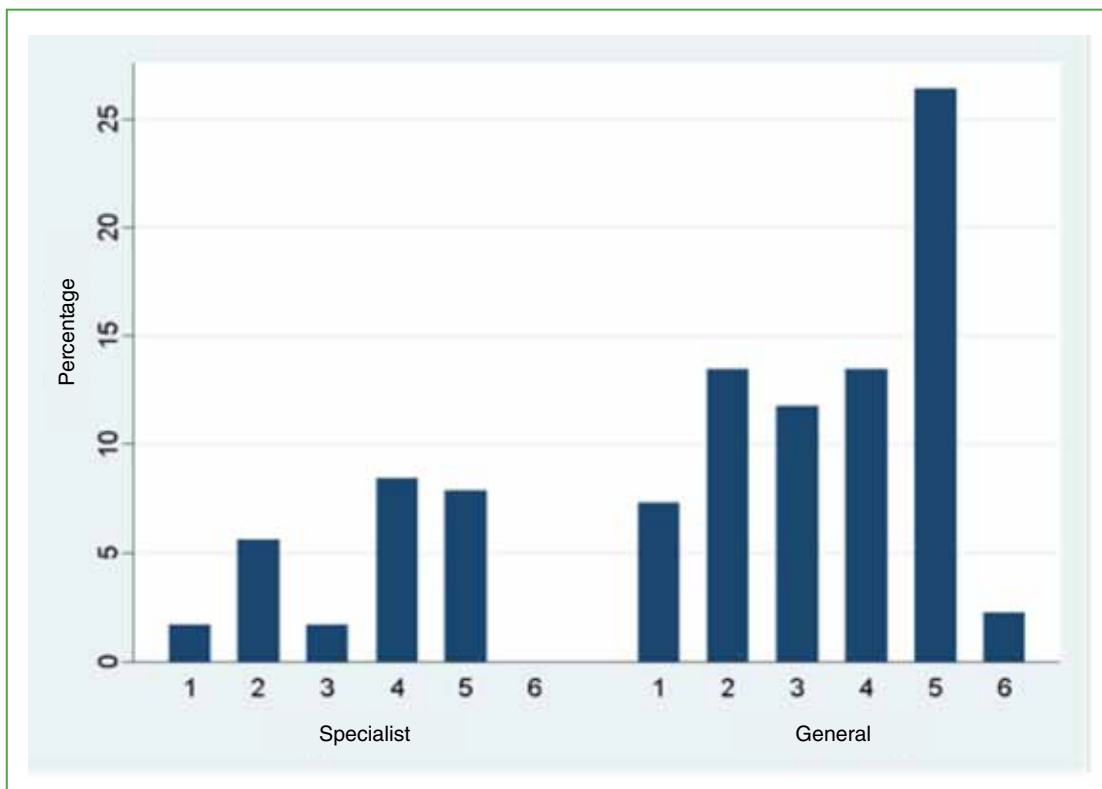


**Figure 4.** Bar chart of the answers to questions 5-13 of the survey (according to the group of professionals).

Regarding the opinion distribution on the number of corticosteroid injections that could be safely given in one year, each group had different the central tendencies ( $P=0.02$  according to the different types of repair (arthroscopy, mini-open repair, and open standard repair), the shoulder specialists' reported average values were 26, 15 and 4 injections per year while the general orthopedic surgeons reported 35, 56 and 19, respectively.

Finally, the respondents had to choose from the multiple-choice answers regarding the factors affecting the patients' ability to participate in the decision-making concerning rotator cuff surgery. Both groups had different opinions ( $P=0.057$ ); Figure 5 shows the distribution of answers 1 to 6: 1) patients having a higher educational background; 2) patients receiving more information; 3) patients having more frequent preoperative consultations; 4) patients having longer preoperative consultations; 5) patients are already involved in the decision-making process; and 6) physicians receiving a greater reimbursement for preoperative consultations.





**Figure 5.** Bar chart of the factors affecting the patients' ability to participate in the decision-making concerning rotator cuff surgery

## DISCUSSION

This study is an attempt to retrieve and collect the different procedures undertaken in the treatment of rotator cuff tear, evaluating the variability regarding their indication, in Argentina. Of the 556 surveys that were delivered, only 162 (29%) were returned completed, compared to the 49% response rate achieved by Dunn *et al.*<sup>1</sup>

In our study, the specialist group reported performing arthroscopic repairs in 60% of the cases, while the general orthopedic group reported performing open repairs in 71% of the cases (49% with mini-open technique and 22% with open standard technique), compared to the 46% overall preference to the mini-open technique obtained in the study conducted by Dunn *et al.*,<sup>1</sup> where a correlation was found between the surgeon's estimation of the failure rate and their surgical volume. There are only two randomized, controlled trials comparing the treatment modalities for rotator cuff tears (operative and nonoperative), and they present contradictory results.<sup>16,17</sup> Kukkonen *et al.*<sup>16</sup> found no differences between both treatment modalities, and Moosmayer *et al.*<sup>17</sup> reported better results for patients who undergo surgical repair.

Regarding the analyzed clinical cases, we found significant variation between the general orthopedic surgeons and the shoulder specialists, particularly in full-thickness rotator cuff tears with a prolonged evolution of months (case 2 of our survey), in small (up to 1cm) full-thickness rotator cuff tears in patients with no significant symptoms and no previous treatments (case 3 of our survey), and in significantly retracted tears with fatty infiltration of in patients who had sustained a traumatic injury (case 4 of our survey). The greatest correlation on the surgical repair indication between both groups corresponds to case 1 of our survey (painful partial-thickness rotator cuff tears in young patients who had sustained a traumatic injury), for which the respondents' prevalent opinion agrees with the published treatment of choice for this type of tears.<sup>2</sup>



The least indicated treatment in all cases was the use of corticosteroid injections, and the second least indicated was surgery without RCR. Both groups of professionals had similar opinions ( $P=0.74$ ) regarding the contraindication for corticosteroid injections used in potential surgical candidates ( $P=0.353$ ), which contraindication is supported by Mohamadi *et al.*, who reported that corticosteroid injections give small and transient pain relief, do not modify the natural course of the condition, and owe their outcomes to the placebo effect.<sup>18</sup>

Regarding the indication for physical therapy, most of the general orthopedic surgeons agreed on it being useful for treating full-thickness rotator cuff tears, i.e., treated conservatively, while the shoulder specialists had a more heterogeneous opinion distribution. Regarding question 7, the general orthopedic surgeons expressed more indifference on the patients' expectations after the RCR. The general orthopedic surgeons showed great correlation among themselves on agreeing in the active involvement of patients in the surgical decision-making. Several factors may influence the outcome of postoperative rotator cuff healing;<sup>19-22</sup> in this regard, the prevention of shoulder osteoarthritis was a consideration taken homogeneously by both groups, and most of the respondents considered repairing these injuries as a way to prevent further complications.

Both professional groups considered that surgeons should spend more time discussing the pros and cons of the RCR with the patients before the surgery ( $P=0.27$ ). The statement of question 13, posing that the expected frequency and duration of rehabilitation should be discussed with patients preoperatively, was the one that had the most acceptance among the shoulder specialists ( $P=0.07$ ). According to Manaka *et al.*,<sup>23</sup> although arthroscopic repair is a relatively minor procedure, the postoperative rehabilitation period may be long and intense, and the level of recovery as well as the time the of recovery vary between patients.

The limitations of our study were those derived from the retrospective nature of the analysis, the comparison of two groups of orthopedic surgeons (general and specialist) by means of self-administered surveys, the lack of homogeneity regarding the number of returned surveys, and the low rate of returned surveys. However, the absence of this type of study in Argentina, a research on the variability in the therapeutic indications for rotator cuff tears, makes this study of great scientific validity.

## CONCLUSIONS

In Argentina, the shoulder specialists considered the arthroscopic repair to be the surgical method of choice for rotator cuff tears, while the general orthopedic surgeons preferred the mini-open repair technique, and the overall estimation of failure rate for patients undergoing RCR in Argentina was 20%. To summarize, the management of these patients is variable, which hinders establishing protocols or consensus guidelines to help standardize treatments for these injuries.



Please mark your level of agreement or disagreement with each of the following statements:

	Strongly disagree	Disagree	Indifferent	Agree	Strongly agree
5. Physical therapy is useful for conservatively treating full-thickness rotator cuff tears.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. The use of corticosteroid injections in potential surgical candidates is contraindicated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Patients should expect to achieve "normal" shoulder after the rotator cuff repair.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Surgeons should decide and then tell patient whether or not to undergo a rotator cuff repair.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. When recommending a rotator cuff repair, surgeons should explain the options to the patients and let them decide whether or not to undergo surgery.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. A major reason to repair a rotator cuff tears is to prevent tear progression.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. A major reason to repair a rotator cuff tears is to prevent shoulder osteoarthritis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Surgeon should spend more time discussing preoperatively with the patient the pros and cons of the rotator cuff repair.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. The expected frequency and duration of postoperative rehabilitation of the rotator cuff should be discussed with patients preoperatively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. What is the maximum number of corticosteroid injections that could be safely given in one year?

- 1       2       3       4       5

15. My patients could participate more in the decision-making process concerning rotator cuff surgery if (you can mark more than one):

- patients had a higher educational background
- patients received more information (leaflet, videos, apps, internet, etc.)
- patients had more frequent preoperative consultations.
- patients had longer preoperative consultations
- my patients are already involved in the decision-making process
- physicians received a greater reimbursement for preoperative consultations

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