

Attitudes of Canadian Plastic Surgeons on Temporal Artery Biopsy in Giant Cell Arteritis Management

Ann-Sophie Lafreniere, MD*

Rebecca Hartley, MD, MSc,
FRCSC*

Brett Ponich, MD†

Duncan Nickerson, MD, FRCSC,
FACS*

Claire F. Temple-Oberle, MD,
MSc, FRCSC*

Background: Temporal artery biopsies (TAB) rarely impact management of patients with suspected giant cell arteritis and carry complications. We sought plastic surgeons' perspectives on this procedure's risks and benefits.

Methods: An email survey was designed, piloted, and refined to elicit Canadian Society of Plastic Surgeons (CSPS) members about TAB's diagnostic contribution, complications, usefulness as a resident education tool, and surgeons' insight into emerging diagnostic modalities like ultrasound. Text comments were sought at each question. A reminder was emailed one week later. Data was compared and analyzed using the chi-squared test and student *t*-test.

Results: An estimated 83 responses were received from 435 surgeons (19%). Of the surgeons, 20% voiced uncertainty regarding TAB indications; 40% were unsure if TAB results changed steroid duration and dose; 83% did not see patients postoperatively. Surgeons recalled 29 cases of hematoma and three facial nerve injuries from TAB. In total, 80% felt TAB was a valuable learning opportunity for residents, although residents were involved in only 21% of cases; 65% of surgeons supported a changeover to ultrasound as primary diagnostic modality. Analysis of text comments revealed a sense of futility from TAB and disdain toward being mere technicians. Several participants wished for stakeholders to collaborate and potentially endorse noninvasive diagnostic modalities.

Conclusions: This survey demonstrated varying attitudes to TAB. Generally, plastic surgeons were uncertain of TAB's contribution to treatment, tended not to follow-up on results or patients, and recognized a number of complications. Conversations are desired regarding switching from scalpel to probe to evaluate the temporal artery. (*Plast Reconstr Surg Glob Open* 2021;9:e3715; doi: 10.1097/GOX.0000000000003715; Published online 20 July 2021.)

INTRODUCTION

The American College of Rheumatology (ACR) has established criteria to help diagnose giant cell arteritis (GCA), a vasculitis with predominantly mononuclear cell infiltration and granulomatous inflammation. These include age older than 50 years at onset, new headache, temporal artery abnormality (tender to palpation or decreased pulsation), elevated erythrocyte sedimentation rate (more than 50 mm/hour), and abnormal temporal artery biopsy (TAB).¹ The presence of three or more of

these criteria yields a sensitivity of 93.5% and a specificity of 91.2% for GCA diagnosis.¹ Although TAB is only one of five equally weighted criteria, rheumatologists often consider it important as best confirmation of GCA. However, this procedure is not without risk, including facial nerve injury, alopecia, and scalp necrosis.² As potential complications of untreated GCA may have serious, permanent consequences, including ocular ischemia, visual loss and stroke, it is recommended that corticosteroid administration should not be delayed while waiting for a biopsy.³

Another negative to TAB is that the vasculitis may display "skip lesions" on microscopy, resulting in a missed diagnosis (false-negative). In a series of 60 GCA patients with 6000 serial sections, skip lesions were identified in 17 patients (28%).⁴ The incidence of false-negative TABs has been reported between 30% and 44%,⁵ and its sensitivity is found to be 86%.⁶

From the *Section of Plastic and Reconstructive Surgery, University of Calgary, Calgary, Alberta, Canada; and †Cummings School of Medicine, University of Calgary, Calgary, Alberta, Canada.

Received for publication February 25, 2021; accepted May 27, 2021.

Copyright © 2021 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](#), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/GOX.0000000000003715

Disclosure: The authors have no financial interest in relation to the content of this article.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

Recognizing the shortcomings of TAB, other diagnostic modalities (such as color Doppler ultrasound) have been investigated. The TABUL trial has demonstrated that ultrasound was more sensitive, less specific, and more cost effective than TAB.⁷ The lack of a halo sign (periluminal dark halo detected by color Doppler ultrasound) can safely preclude the need for a biopsy with a high negative predictive value of 96%.⁸ In Europe, fast-track ultrasound clinics for early diagnosis of GCA are prevalent and have demonstrated a reduction in the permanent visual impairment.^{9,10} This raises the question: Is performing TAB still best practice, when it may not change treatment and when there may be noninvasive diagnostic modalities?

METHODS

Study Population

Canadian plastic surgeons registered as members of the Canadian Society of Plastic Surgeons (CSPS) were invited to complete a self-administered online survey. Approval of the study was obtained from the institutional review board of the University of Calgary (reference no.: REB20-0405).

Survey Design

After identifying the problem (Canadian plastic surgeons' attitudes to TAB are unknown), a needs assessment was performed by consulting key stakeholders and reviewing the literature. A population-specific survey was felt to be the optimal approach to fulfill our objective.

Following literature review, the survey questions were designed, addressing logistical details of the procedure, residents' involvement and education, TAB complications, impact of TAB on GCA management, and the impact of emerging diagnostic modalities. The survey comprised 20 questions requiring 5–7 minutes to complete. (See **appendix, Supplemental Digital Content 1**, which displays the survey completed by participants. <http://links.lww.com/PRSGO/B723>.) Participants had to answer multiple choice questions, with the option to elaborate. Answering each question was mandatory before moving to the next.¹¹ The survey was piloted and refined before its distribution, with a focus on minimizing survey burden by parsimonious choice of questions. The survey was hosted on a secure web-based platform (Qualtrics, Toronto, Canada).

Survey Distribution

The survey was distributed by email to 435 plastic surgeons working in Canada. They were identified and contacted through the email list of CSPS members. The survey was available online for two weeks in the Fall of 2020. A reminder was sent one week following the initial email.

Statistical Analysis

Data was exported into a statistical analysis software, STATA (version 14).¹² Statistically significant differences were identified by the chi-squared test for categorical variables and the Student *t*-test for continuous variables, with a *P* value less than 0.05. Descriptive statistics were reported.

RESULTS

A total of 83 responses were obtained for a response rate of 19%. Responses were evenly distributed among provinces. Nearly equal proportion of surgeons had a purely academic or purely community practice; only 3.8% had a mixed practice. Twenty-three percent of surgeons were new to practice (0–5 years), 15% were 6–10 years into practice while 32% had more than 11 years of experience. Nearly all surgeons had performed a TAB (96%) and 76% of surgeons had performed a TAB within the last year. The majority of surgeons performed between one and five TABs a year; however, eight reported performing more than 16 TABs a year (Fig. 1). No correlation was found between the number of TABs performed per year and the surgeons' years into practice. The majority of surgeons (92%) performed TABs in a minor surgery setting.

Eighty percent of surgeons believed TABs were valuable learning opportunities for learners; however, residents were reportedly involved in only 20% of TABs. Surgeons thought TABs provided a “setting to work on technical skills” and were “a gateway to learning handling vessels with care for microsurgery.” Ninety-seven percent of staff reported that a TAB takes them less than 30 minutes to complete, whereas having a learner increases the time up to 45 minutes (Fig. 2).

Eighty-one percent of staff knew the indications for a TAB, but only 56% knew the impact of TAB on GCA management (Table 1). More specifically, 20% of staff were unaware of the implication of a positive TAB and 42% reported knowledge gaps regarding the implications of a negative TAB. No correlation was found between the surgeons' years into practice and their knowledge around TAB indications and implications on treatment.

When asked how many patients were already on steroids before TAB, surgeons' answers varied with no discernable pattern (Fig. 3). No correlation was found between the type of practice and the estimated prevalence of patients on corticosteroids pre-TAB. Twenty-one percent of surgeons reported that their last TAB result did not affect initiation or discontinuation of therapy (Table 2), while 43% did not know. Twenty-four percent of surgeons

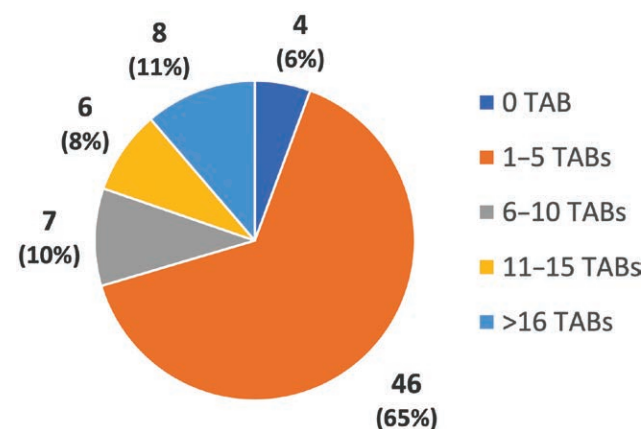


Fig. 1. Reported number of TABs performed per year.

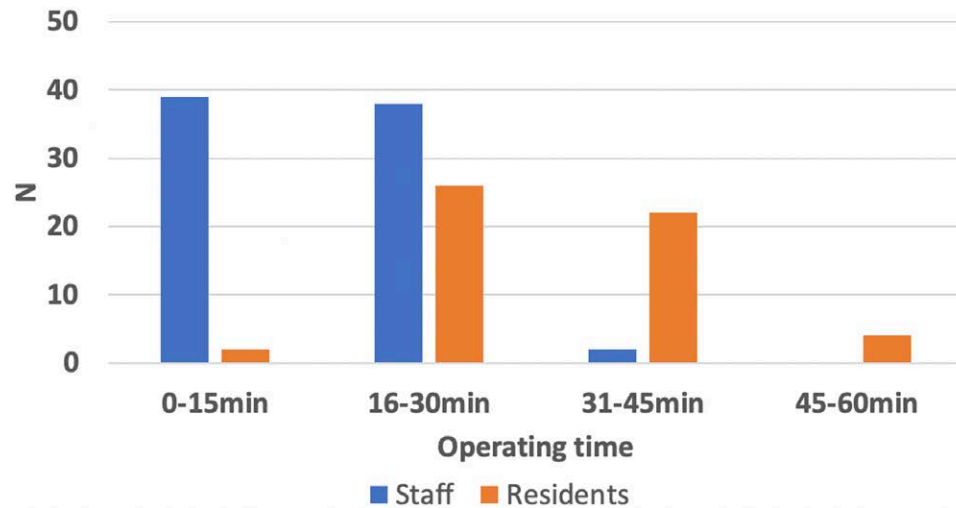


Fig. 2. Reported time required by attending staff versus surgical residents to perform a TAB.

Table 1. TAB-related Knowledge

	Frequency	
	n	(%)
Do you know:		
The indications for a TAB?		
Yes	65	81.25
No	15	18.75
(Total responses: 80)		
The TAB impact on GCA management?		
Yes	45	56.25
No	35	43.75
(Total responses: 80)		
The implications of a positive TAB?		
Yes	64	80.00
No	16	20.00
(Total responses: 80)		
The implications of a negative TAB?		
Yes	46	58.23
No	33	41.77
(Total responses: 79)		

reported that their last TAB result did not affect treatment duration, while 41% did not know.

Forty-two percent of surgeons surveyed previously dealt with a TAB complication (a patient of theirs or of a colleague's) (Table 3). Thirty-five percent of surgeons

recalled a significant bleed, 6% alopecia and 4% a facial nerve injury. A large majority of surgeons (83%) did not follow up with patients and let the referring physician communicate the results to patient. Only 11% of surgeons organized follow-up, while 4% would phone patients with results. No correlation was found between the manner of TAB results communication and the surgeons' years into practice.

After presentation of information on alternate diagnostic modalities such as Doppler ultrasound, 65% of plastic surgeons were in favor of encouraging the use of ultrasound as a primary diagnostic modality for GCA. Free text comments from surgeons revealed enlightening information on the implementation of emerging diagnostic modalities. Some surgeons believed the decision was not theirs to make—"The diagnostic modality should be chosen by the referring physician." Some questioned the reliability of ultrasound at diagnosing GCA—"[...] only until adequate US available." Some preferred reaching out to the collaborative care team—"I would consider ultrasound if supported by the rheumatology and radiology community." Prior attempts at pushing for ultrasound instead of TABs were met with resistance from various colleagues—"I have tried but

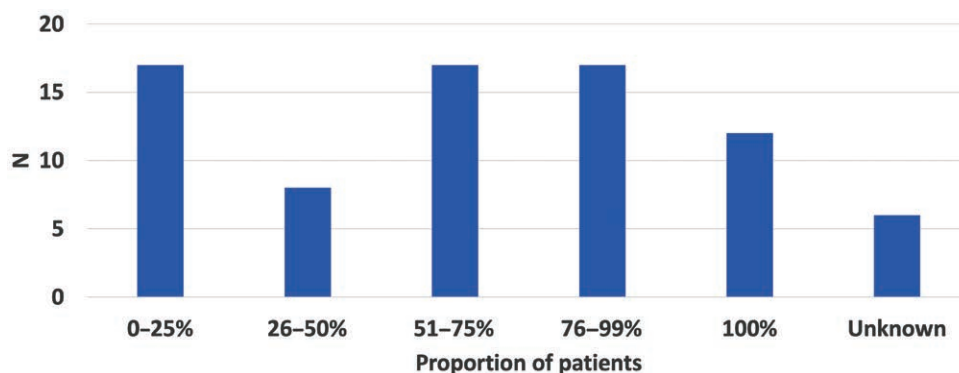


Fig. 3. Reported proportion of patients treated with corticosteroid therapy before TAB.

Table 2. TAB's Impact on Corticosteroids Therapy

	Frequency	
	n	(%)
Considering your last TAB:		
Did the TAB result affect treatment duration?		
Yes	13	16.67
No	24	30.77
I don't know	41	52.56
(Total responses: 78)		
Did the TAB result affect initiation or discontinuation of therapy?		
Yes	14	17.95
No	21	26.92
I don't know	43	55.13
(Total responses: 78)		

often get resistance from the referring physician”—or limited by the lack of experience in the ultrasound scan—“Radiologists and rheumatologists are not comfortable performing and interpreting [TAB results].” Success stories were occasional—“We have recently instituted this at the hospitals I work at, which has led to a significant reduction in biopsies.” Another respondent established an ultrasound pathway in their center after joining a GCA working group.

Opinions on the role of TAB for the diagnosis and management of GCA, in the context of emerging diagnostic modalities, were polarized. Some surgeons were strongly opposed to TAB and failed to see its value. One opined, “we should not be doing TAB, another TAB is a procedure of the past and has no relevance in today’s rheumatology diagnostics.” One surgeon felt that “most TABs seem to be a waste of time as most patients are negative and already treated.” Others believed their opinion need not to be sought as surgeons are “only technicians.” Finally, some surgeons were of the opinion that TAB should be done when “doing the biopsy will affect treatment.”

Table 3. TAB Complications

	Frequency	
	n	(%)
Have you ever dealt with a TAB complication?		
Yes	34	41.98
No	47	58.02
(Total responses: 81)		
Reported complications		
Dehiscence	8	9.64
Infection	5	6.02
Bleeding	29	34.94
Facial nerve injury	3	3.61
Alopecia	5	6.02
(Total responses: 83)		
How do you communicate TAB results to patients?		
Follow-up	9	10.84
Phone call	3	3.61
Referring physician	69	83.13
(Total responses: 81)		
Should plastic surgeons encourage performing ultrasound as primary modality for the diagnosis of GCA?		
Yes	51	65.38
No	3	3.85
Maybe	24	30.77
(Total responses: 78)		

DISCUSSION

With the emergence of Doppler ultrasound for diagnosing GCA,⁷ and the validation of the ACR criteria,¹ surgeons are questioning the necessity of TAB in patients with high clinical suspicion for GCA or those who have already satisfied the ACR diagnostic criteria for GCA, given the invasive nature of the procedure and its potential complications.¹³ Our group designed a survey to assess Canadian plastic surgeons’ attitudes toward TAB in the diagnosis and management of GCA.

Self-reported Gaps in Knowledge

The knowledge of surgeons around the role of TAB in the diagnosis and management of GCA was modest, which could not be corroborated given the lack of literature on the subject. Our survey demonstrated that a substantial number of surgeons perform TAB without knowing how the procedure fits into the diagnostic and treatment algorithm of GCA, in particular how the biopsy result impacts the decision-making around corticosteroid therapy. The uncertainty was notable especially in case of a negative biopsy result. These self-reported gaps in knowledge may stem from the relative paucity of emphasis and teaching about GCA and TAB in surgical residency.

Polarized Opinions on Role of TAB

Canadian surgeons have polarized opinions on the role of TAB for the diagnosis and management of GCA, in the context of emerging diagnostic modalities. Enlightening comments were recorded from participants, displaying varying opinions on how involved surgeons should be in choosing the diagnostic modality for GCA. Many thought TAB is a procedure of the past and should not be performed anymore given its low yield on influencing management of patients with suspected GCA and should only be performed on select patients. The free text comments on the contemporary role of TAB given alternate options were thought-provoking. Some respondents felt we should be more involved in the decision-making process, and not just functioning as technicians. This will require improving our knowledge around the role of TAB in diagnosis and management of GCA. Not knowing how TAB actually changes management exemplifies accepting a pattern of care that bears revisiting.

This belief that TAB is an outdated procedure may also stem from a nihilistic attitude among surgeons who perform TABs and subsequently observe that TAB results, whether positive or negative, do not impact management. Indeed, with a high clinical suspicion of GCA, rheumatologists tend to treat patients with corticosteroids regardless of the TAB result. A previous retrospective review has demonstrated that in patients with a high clinical suspicion of GCA (an ACR criteria score of 3 or more), the TAB result changed management in less than 10% of cases.¹⁴ Treatment duration is not dependent on biopsy result, but rather on clinical improvement. These elements contribute to the growing belief amongst surgeons that TAB might not be a useful procedure after all in guiding therapy for patients with suspected GCA.

From Knife to Probe

Although a majority of surgeons would support a changeover to ultrasound as primary diagnostic modality for GCA, there remain barriers to its implementation. Surgeons need to learn from other surgeons' success stories to change a perhaps outdated practice. Discussion with a group of stakeholders could help improve the resistance faced by surgeons from the referring physicians when bringing up alternative diagnostic modalities.⁹ As ultrasound has a learning curve, centers need to have staff trained in ultrasound specifically for GCA and must know how to interpret the scans. Limited availability to rheumatologists and of ultrasound may limit the use of ultrasound in making a diagnosis of TAB.

Underestimation of Complications and Impact from Lack of Follow-up

Only 14% of surgeons organize follow-up with patients after a TAB, which may contribute to an underestimation of complications resulting from TAB, especially long-term issues such as alopecia. Many surgeons recalled complications over the course of their practice, including bleeding, facial nerve injury, and alopecia. This is consistent with another group who reported 3% of permanent frontal nerve palsy.¹⁵ Learning from the complications and impacts of a procedure on patient care is integral to conscientious surgical care.

Educational Value of TAB

Surgeons hailed TABs as an educational modality for vessel dissection and preparation, which are useful skills for microsurgery; however, they indicated that it was uncommon for residents to be present for these procedures. As such, the limited involvement of residents, the lack of knowledge around the procedure's implications and impact on patient care, and the lack of postoperative follow-up argue against retaining this procedure for educational purposes.

Limitations

Surgeons who are passionate about the topic might have preferentially completed our survey, introducing a selection bias. Recall bias and the self-reported nature of the survey also limit the inferences that we can draw from this data. Future directions underway include a retrospective and prospective study of TABs performed locally in Calgary, Alberta, to analyze their impact on management as well as their complications.

CONCLUSIONS

This survey has demonstrated that Canadian plastic surgeons have varying knowledge and attitudes to TAB. Gaps exist in the impact of TAB on management. With limited postoperative follow-up, there is likely an underestimation

of complications from the procedure. Some surgeons embrace a transition from surgical to imaging evaluation of the temporal artery. Some barriers are foreseen in the transition away from TAB, inviting multidisciplinary collaboration to move forward for better patient care.

Claire F. Temple-Oberle, MD, MSc, FRCSC

Foothills Medical Centre

1403 29 St NW

Calgary, AB, T2N 2T9

Canada

E-mail: claire.temple-oberle@albertahealthservices.ca

REFERENCES

- Hunder GG, Bloch DA, Michel BA, et al. The American College of Rheumatology 1990 criteria for the classification of giant cell arteritis. *Arthritis Rheum.* 1990;33:1122–1128.
- Czyz CN, Allen JB, Cahill KV, et al. Effects of incision location on specimen quality and complications for temporal artery biopsy. *Vascular.* 2019;27:347–351.
- Mukhtyar C, Guillevin L, Cid MC, et al; European Vasculitis Study Group. EULAR recommendations for the management of large vessel vasculitis. *Ann Rheum Dis.* 2009;68:318–323.
- Klein RG, Campbell RJ, Hunder GG, et al. Skip lesions in temporal arteritis. *Mayo Clin Proc.* 1976;51:504–510.
- Ashton-Key MR, Gallagher PJ. False-negative temporal artery biopsy. *Am J Surg Pathol.* 1992;16:634–635.
- Niederkofer RD, Levin LA. Management of the patient with suspected temporal arteritis a decision-analytic approach. *Ophthalmology.* 2005;112:744–756.
- Luqmani R, Lee E, Singh S, et al. The role of ultrasound compared to biopsy of temporal arteries in the diagnosis and treatment of giant cell arteritis (TABUL): a diagnostic accuracy and cost-effectiveness study. *Health Technol Assess.* 2016;20:1–238.
- Nesher G, Shemesh D, Mates M, et al. The predictive value of the halo sign in color Doppler ultrasonography of the temporal arteries for diagnosing giant cell arteritis. *J Rheumatol.* 2002;29:1224–1226.
- Diamantopoulos AP, Haugeberg G, Lindland A, et al. The fast-track ultrasound clinic for early diagnosis of giant cell arteritis significantly reduces permanent visual impairment: towards a more effective strategy to improve clinical outcome in giant cell arteritis? *Rheumatology (Oxford).* 2016;55:66–70.
- Monti S, Bartoletti A, Bellis E, et al. Fast-track ultrasound clinic for the diagnosis of giant cell arteritis changes the prognosis of the disease but not the risk of future relapse. *Front Med (Lausanne).* 2020;7:589794.
- Kern DE, Thomas PA, Hughes MT. In: Kern DE, Thomas PA, Hughes MT, eds. *Curriculum Development for Medical Education: A Six-Step Approach.* 2nd ed. Baltimore, Md.: Johns Hopkins University Press; 2009.
- Statacorp. *InventorStata Statistical Software.* Release 14. 2015.
- Gunawardene AR, Chant H. Facial nerve injury during temporal artery biopsy. *Ann R Coll Surg Engl.* 2014;96:257–260.
- Davies C, Frost B, Eshan O, et al. Temporal artery biopsy. Who needs one? *Postgrad Med J.* 2006;82:476–478.
- Yoon MK, Horton JC, McCulley TJ. Facial nerve injury: a complication of superficial temporal artery biopsy. *Am J Ophthalmol.* 2011;152:251–255.e1.