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Management of giant-cell arteritis in Switzerland: an online national survey

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Summary

AIMS OF THE STUDY: To assess current practices in diagnosing, treating, and following-up giant-cell arteritis by specialists in Switzerland and to identify the main barriers to using diagnostic tools.

METHODS: We performed a national survey of specialists potentially caring for patients with giant-cell arteritis. The survey was sent by email to all members of the Swiss Societies of Rheumatology and for Allergy and Immunology. A reminder was sent to nonresponders after 4 and 12 weeks. Its questions covered the following dimensions: respondents' main characteristics, diagnosis, treatment, and imaging's role during follow-up. The main study results were summarized using descriptive statistics.

RESULTS: Ninety-one specialists, primarily aged 46–65 years (n = 53/89; 59%), working in academic or nonacademic hospitals or private practice, and treating a median of 7.5 (interquartile range [IQR]: 3–12) patients with giant-cell arteritis per year participated in this survey. Ultrasound of temporal arteries/large vessels (n = 75/90; 83%) and positron-emission-tomography-computed tomography (n = 52/91; 57%) or magnetic resonance imaging (n = 46/90; 51%) of the aorta/extracranial arteries were the most common techniques used to diagnose giant-cell arteritis with cranial or large vessel involvement, respectively. Most participants reported a short time to obtain imaging tests or arterial biopsy. The glucocorticoid tapering scheme, glucocorticoid-sparing agent, and glucocorticoid-sparing treatment duration varied among the participants. Most physicians did not follow a predefined repeat imaging scheme for follow-up and mainly relied on structural changes (vascular thickening, stenosis, or dilatation) to drive treatment choice.

CONCLUSIONS: This survey indicates that imaging and temporal biopsy are rapidly accessible for diagnosing giant-cell arteritis in Switzerland but highlights heterogeneous practice in many disease management areas.

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Introduction

Giant cell arteritis is large vessel vasculitis usually occurring in those aged over 50 years [1]. In addition to the classical cranial phenotype, giant-cell arteritis can affect large vessels in isolation or combination with cranial arteries and is frequently associated with polymyalgia rheumatica [1].

Giant-cell arteritis can cause severe complications such as vision loss, critical vascular stenosis, ischemic stroke, or life-threatening haemorrhage secondary to aneurysmal rupture [1]. A prompt diagnosis, balanced treatment, and careful follow-up are necessary to preserve and restore a patient's health and minimize the risks of damage accrual [2, 3] and treatment-related side effects.

Our knowledge about giant-cell arteritis has steadily improved in recent years. The increasing availability of advanced imaging techniques has favoured a more accurate giant-cell arteritis diagnosis and characterization [4, 5]. Randomized controlled trials have shown the utility of methotrexate and tocilizumab (anti-interleukin 6 receptor [IL6R]) as glucocorticoid sparing agents [6–8], with other molecules currently being tested [9, 10]. However, many questions about giant-cell arteritis diagnosis, treatment, and optimal patient follow-up remain unanswered. International guidelines [2, 3] exist, but some of their aspects are based mainly on low-quality data or driven by expert opinion. Additionally, the management of giant-cell arteritis patients can be influenced by other factors, such as the care setting, physician's experience, or resource availability. All these aspects and the coexistence of different giant-

cell arteritis phenotypes likely contribute to heterogeneity in management.

As a first step in developing guidance for physicians caring for giant-cell arteritis patients, we conducted this study to assess current practices in diagnosing, treating, and following-up giant-cell arteritis by specialists in Switzerland and to identify the main barriers to using diagnostic tools.

Methods

Data collection and procedure

Data were collected between March and June 2021 using an online survey. The study data were collected and managed using research electronic data capture (REDCap) tools hosted at Geneva University Hospitals [11, 12]. This study used a cross-sectional online observational anonymous survey of members of the Swiss Society of Rheumatology (SSR) and The Swiss Society for Allergology and Immunology (SSAI; table 1).

Structure of the survey

A 29-question online survey (tables 1–3) was developed to investigate differences in giant-cell arteritis diagnosis, treatment, and follow-up practices in Switzerland. It was designed by a board of Swiss experts in the field (MI, AKM, MS, and TD) following recommendations from the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [13]. It included a combination of closed- and open-ended questions and multiple-choice questions. It was developed in English to account for language differences across Swiss Cantons.

The questions covered the following dimensions: respondents' main characteristics (age, place of residence, speciality, work setting, and years of medical practice), diagnosis (diagnostic tools used in patients with cranial involvement and noncranial, large-vessel giant-cell arteritis involvement; the average time to obtain specific diagnostic tests; specialists performing temporal artery biopsy; and perceived quality), treatment (tapering glucocorticoid scheme, the extent of glucocorticoid-sparing agent use, glucocorticoid-sparing agent choice and treatment duration, and supportive therapy), and imaging's role during follow-up (which imaging technique, when and for how long after remission, and treatment decisions). The complete survey is reported in tables 1–3. The survey was pretested for its feasibility and understandability by all authors of this study. No significant adjustments were needed.

Participants

Specialists were eligible to participate if they were practising in Switzerland and could understand English. The invitation link to participate in the REDCap survey was sent by the Swiss Society of Rheumatology and the Swiss Society for Allergology and Immunology to all their members via email. A reminder was sent after 4 and 12 weeks.Participants were invited to share the survey link with colleagues from other specialities involved in managing giant-cell arteritis (snowball sampling technique). The survey was accompanied by a cover letter explaining the study's purposes. Respondents were not compensated for their participation, which was voluntary and implied consent. All responses were anonymous, and no identifying information was collected. Participants could quit the survey anytime and use a back function to change their answers.

Statistical analysis

Categorical variables are presented as frequencies and percentages. Continuous variables are presented as medians (interquartile ranges). Categorical variables were compared using Chi-square or Fisher's exact tests, as appropriate. We used subgroup analyses to investigate differences according to participants' work settings (private practice, nonacademic hospital, or academic hospital) and experience, defined based on the median number of individual giant-cell arteritis patients seen per year: ≤7, less experienced; >7, experienced. A P-value <0.05 was considered statistically significant. Analyses were performed using the R statistical software (v.4.1; R Development Core Team, Vienna, Austria).

Ethics approval

This study did not require ethical approval since it did not involve human participants.

Results

Participant's main characteristics

Due to the snowball sampling technique, in which Swiss Society of Rheumatology and Swiss Society for Allergology and Immunology members could send the survey link to other specialists who may treat giant-cell arteritis, a participation rate could not be calculated. Ninety-one specialists, mostly rheumatologists (n = 72; 79%), working in nonacademic hospitals (n = 46; 52%), private practice (n = 44; 49%), or academic hospitals (n = 14; 17%) and treating a median of 7.5 (interquartile range [IQR] 3–12) patients per year participated in this survey. Detailed information on participants is shown in table 1. Forty-three (47%) participants were considered 'experienced' according to the above definition. Twenty-six participants (27%) declared more than one specialization.

Diagnosis

Diagnostic tests planned in patients with suspected giant-cell arteritis with cranial or large vessel involvement

When giant-cell arteritis with cranial involvement was suspected, the participants reported ordering a median of 2 (IQR 2–3) diagnostic tests. Those most commonly prescribed were ultrasound of the temporal and/or axillary arteries (83%) and temporal artery biopsy (51%; table 1). About 42% stated performing temporal artery biopsy only when imaging was negative. In contrast, the imaging techniques most commonly used to confirm large vessel involvement (median of 2 [IQR 1–3] modalities) were fluorine-18 fluorodeoxyglucose positron emission tomography-computed tomography (PET-CT; 57%), ultrasound of the temporal and/or axillary arteries (52%), and

Table 1:
Participants' characteristics and diagnostic approaches.

Question		Participants, n (%)	Missing (%)
Age (years)	25–35	7 (8)	2
	36–45	23 (26)	
	46–55	26 (29)	
	56–65	27 (30)	
	>65	6 (7)	
Male, n (%)		58 (64)	2
Years of medical practice	0–5	0 (0)	2
	6–10	10 (11)	
	10–15	14 (15.5)	
	16–20	14 (15.5)	
	21–30	38 (42)	
	>30	13 (14)	
Setting*	Private practice	44 (49)	1
	Nonacademic hospital	46 (52)	
	Academic hospital	14 (17)	
	Other	2 (2)	
Speciality*	Rheumatology	72 (79)	1
	Immunology	17 (19)	
	Internal medicine	26 (29)	
	Other	2 (2)	
Number of patients with giant-cell arteritis seen per year, median (IQR)		7.5 (3–12)	1
When suspecting giant-cell arteritis with cranial symptoms, which diagnostic tests do you prescribe in daily practice?*	Ultrasound of temporal arteries	75 (83)	1
	MRI of temporal or other cranial arteries	30 (33)	
	PET-CT of the aorta/extracranial arteries	29 (32)	
	MRI of the aorta/extracranial arteries	29 (32)	
	Contrast-enhanced angiography	5 (5)	
	Temporal artery biopsy	46 (51)	
	Temporal artery biopsy only if signs of vasculitis are absent at imaging	38 (42)	
When suspecting giant-cell arteritis without cranial symptoms, which diagnostic tests do you prescribe in daily practice?*	Ultrasound of temporal artery	47 (52)	1
	MRI of temporal or other cranial arteries	14 (15)	
	PET-CT of the aorta/extracranial arteries	52 (57)	
	MRI of the aorta/extracranial arteries	46 (51)	
	Contrast-enhanced CT	6 (7)	
	Temporal artery biopsy	22 (24)	
	Temporal artery biopsy only if signs of vasculitis are absent at imaging	19 (21)	
Temporal artery biopsy in my hospital/clinics:*	Is usually performed in <3 working days	57 (63)	1
	Can usually only be performed after ≥3 working days	23 (25)	
	Is correctly performed (temporal artery specimen >1 cm)	59 (65)	
	The pathologist describes histology in detail (inflammation, fibrosis, and vessel occlusion)	55 (60)	
	The pathologist's comment (vasculitis vs other) is based on the description	28 (31)	
	The histology is performed at my institution	33 (36)	
	The histology is performed by a specialized lab	28 (31)	
The ultrasound of temporal arteries in my hospital/clinics is:*	Performed by myself or my colleagues in the rheumatology/immunology/internal medicine unit	18 (20)	1
	Performed by angiologists	54 (59)	
	Performed by neurologists	22 (24)	
The ultrasound of temporal arteries in my hospital/clinics is usually available:	On the day of presentation	21 (23)	9
	Within one working day	15 (16)	
	Within two working days	27 (30)	
	Within four working days	12 (13)	
	Within six working days	8 (9)	
The person performing the ultrasound routinely examines:*	The branches of the temporal artery	74 (81)	1
	The carotid arteries	61 (67)	
	The axillary arteries	45 (49)	
	The vertebral arteries	37 (41)	
	The subclavian arteries	45 (49)	
	The iliac arteries	8 (9)	

	The femoral arteries	13 (14)	
The person performing the ultrasound:*	Describes the 'halo' sign for the temporal artery	78 (86)	1
	Describes the compression sign for the temporal artery	57 (63)	
	Has great experience with diagnosing giant-cell arteritis	25 (27)	
	Has moderate experience with diagnosing giant-cell arteritis	37 (41)	
	Has only limited experience with diagnosing giant-cell arteritis	10 (11)	
The MRI of temporal arteries or other cranial arteries in my hospital/clinics is usually available:	Within two working days	26 (29)	14
	Within four working days	30 (33)	
	Within six working days	16 (18)	
	After >6 working days	6 (7)	
The MRI of the aorta/extracranial arteries in my hospital/clinics is usually available:	Within two working day	27 (30)	13
	Within four working days	30 (33)	
	Within six working days	12 (13)	
	After >6 working days	11 (11)	
The PET/CT of the aorta/extracranial arteries in my hospital/clinics is usually available:	Within two working days	10 (11)	14
	Within four working days	28 (31)	
	Within six working days	25 (27)	
	After >6 working days	15 (16)	

* More than one possible answer.

CT: computed tomography; IQR: interquartile range; MRI: magnetic resonance imaging; PET-CT: positron-emission-tomography-computed tomography.

magnetic resonance imaging (MRI) of the aorta/extracranial arteries (51%). Twenty participants reported planning a temporal artery biopsy in cases with normal findings at imaging, even in the absence of cranial symptoms (table 1).

We found no difference in the number of requested diagnostic modalities between physicians with more or less expertise for patients with cranial (median = 2 [IQR 2–3] vs 2 [IQR 2–3]; p = 0.11) or large vessel (median = 2 [IQR 1–3] vs 2 [IQR 1–3]; p = 0.37) involvement.

Ultrasound of the temporal and/or axillary arteries

Most physicians (64/84; 76%) reported that ultrasound of the temporal and/or axillary arteries was accessible within 1–2 working days. Ultrasound of the temporal and/or axillary arteries was typically performed by angiologists (59%) or neurologists (24%), with some participants (20%) stating they performed the ultrasound of the temporal and/or axillary arteries themselves. The expertise of the individual performing the ultrasound of the temporal and/or axillary arteries was rated as moderate (41%), great (27%), or limited (11%). In a few cases, iliac (9%) and femoral (14%) arteries were also studied (table 1).

Temporal artery biopsy

Most participants (63%) stated that temporal artery biopsy was typically available in 1–2 working days. Satisfaction with the quality of the arterial sample ('correctly done, sample length >1 cm'; 65%) and pathology reports (60%) was high (table 1).

Time to obtain diagnostic tests: MRI and fluorine-18 fluorodeoxyglucose PET-CT

MRI of the aorta/extracranial arteries and fluorine-18 fluorodeoxyglucose PET-CT were reported to be available in ≤4 working days in about 70% and 50% of cases, respectively (table 1).

Treatment

Glucocorticoid tapering schemes and sparing agents

Glucocorticoid monotherapy was the most common remission induction option, with different approaches in its discontinuation. Only 46% of participants followed the European League Against Rheumatism (EULAR) recommendations, with a higher guideline adherence among 'experienced' physicians (58% vs 37%; p = 0.07; figure 1a), but without a difference between participants working inside or outside academic settings (figure 1a). Notably, 12% of respondents did not follow a predefined glucocorticoid tapering scheme (table 2).

A glucocorticoid-sparing agent was considered mainly in cases with relapsing diseases (64%) or in giant-cell arteritis patients who had developed or were at increased risk of developing glucocorticoid-related adverse effects or complications (68%; table 2). Fewer than 20% of participants (26% of 'experienced' vs 12% of 'less experienced'; p = 0.08; figure 1b) stated they prescribed glucocorticoid-sparing agents to every giant-cell arteritis patient. Even if not statistically significant, the absolute proportion of physicians always prescribing glucocorticoid-sparing agents was higher for those working in private practice (22.0%) and nonacademic hospitals (13.0%) than in academic hospitals (5.5%; p = 0.19; figure 1b). Tocilizumab was the most commonly used glucocorticoid-sparing agent (96%), with 71% also reporting using methotrexate. The glucocorticoid-sparing agent treatment duration varied widely, with a third of participants (32%) not following a predefined protocol regardless of their expertise or setting (figure 1c). The remaining participants indicated planning discontinuation after at least 12 (25%), 18 (8%), or 24 (12%) months of therapy.

Supportive treatment

About half of the participants reported using antiplatelet agents for giant-cell arteritis as follows: always (14%), only in cases with ocular involvement (16%), or in cases with symptoms suggestive of cranial involvement (18%). Less than half of the participants (44%) reported never prescrib-

ing antiplatelet agents for giant-cell arteritis (figure 1d). The proportion of participants using vitamin D, calcium, and trimethoprim/sulfamethoxazole prophylaxis with glucocorticoid is reported in table 2.

Imaging use during follow-up

Imaging for monitoring structural damage (vascular thickening, stenosis, or dilatation)

The frequency of screening for vascular complications by imaging was heterogeneous (table 3). The most frequently used techniques were MRI of the aorta/extracranial arteries (57%; figure 2a), ultrasound of supra-aortic arteries and abdominal aorta with computed tomography of the thoracic aorta (24%), or fluorine-18 fluorodeoxyglucose PET-CT (10%; table 3). The failure to follow any predefined scheme to monitor vascular complications was higher among 'less experienced' participants (71% vs 41%; p <0.001; figure 2b).

Imaging driving treatment choices (beyond structural damage)

Thirty-seven per cent of participants reported that follow-up imaging did not affect treatment, and 26% would only consider imaging results in patients with suspected relapse (table 3). Inflammatory signs on MRI (34%) or an increased fluorine-18 fluorodeoxyglucose uptake on PET-CT (24%) were reported as imaging findings more often supporting treatment escalation decisions.

Table 2:
Main online survey results: treatment.

Question		Participants, n (%)	Missing (%)
What predefined glucocorticoid tapering scheme do you follow after giant-cell arteritis diagnosis?	Slow: e.g. taper glucocorticoids to 15–20 mg/day within 2–3 months and then to <5 mg/day after one year (EULAR recommendations, 2020)	42 (46)	4
	Fast: e.g. 26-week taper protocol (GiACTA)	10 (11)	
	Fast: 26-week taper protocol (GiACTA) combined with tocilizumab	21 (23)	
	I do not follow a predefined glucocorticoid tapering scheme	11 (12)	
	Other	3 (3)	
Which glucocorticoid-sparing agent do you prescribe?*	Methotrexate	65 (71)	1
	Tocilizumab	87 (96)	
	I do not prescribe glucocorticoid-sparing agents	1 (1)	
	Other	4 (4)	
When do you prescribe a glucocorticoid-sparing agent (methotrexate/tocilizumab)?*	In cases with relapsing disease	58 (64)	1
	To every patient with giant-cell arteritis who has already developed or is at increased risk of developing glucocorticoid-related side effects or complications (osteoporosis, glaucoma, diabetes, and cardiovascular disease)	62 (68)	
	Never	1 (1)	
	In every patient, regardless of newly diagnosed/relapsing disease or glucocorticoid-related adverse events	17 (19)	
	Other	3 (3)	
When do you discontinue glucocorticoid monotherapy once you have achieved disease remission?	6 months after diagnosis	11 (12)	5
	12 months after diagnosis	28 (31)	
	24 months after diagnosis	21 (23)	
	It depends on vascular complications	20 (22)	
	Other	6 (7)	
When do you discontinue a glucocorticoid-sparing agent once you have achieved disease remission?	12 months after the start of glucocorticoid-sparing agent use	23 (25)	2
	18 months after the start of glucocorticoid-sparing agent use	7 (8)	
	24 months after the start of glucocorticoid-sparing agent use	11 (12)	
	It depends on vascular complications	16 (18)	
	I do not follow a predefined scheme	29 (32)	
	Other	3 (3)	
Do you prescribe antiplatelet agents to giant-cell arteritis patients?	Always	13 (14)	2
	Only in cases with ocular giant-cell arteritis-related ischemia	15 (16)	
	In cases with cranial giant-cell arteritis symptoms	16 (18)	
	Only when indicated for other 'non-vasculitic' reasons (e.g. coronary heart disease)	40 (44)	
	Other	5 (5)	
Which supportive therapy do you prescribe in addition to glucocorticoid?*	Vitamin D	87 (96)	1
	Calcium	77 (85)	
	Trimethoprim/sulfamethoxazole	26 (29)	
	Trimethoprim/sulfamethoxazole only when combined with methotrexate or tocilizumab	7 (8)	
	Other	7 (8)	
Do you routinely perform a DEXA scan for osteoporosis?*	Before the start of glucocorticoid therapy or soon afterwards	71 (78)	1
	After 12 months of glucocorticoid therapy	11 (12)	
	Never	1 (1)	
	Other	9 (10)	

* More than one possible answer.

DEXA: dual-energy X-ray absorptiometry; EULAR: European League Against Rheumatism; GiACTA: Giant-Cell Arteritis Actemra trial.

Discussion

We investigated how specialists manage patients with giant-cell arteritis in Switzerland to identify differences in diagnostic, treatment, and follow-up strategies that could be addressed to harmonize management and improve patient outcomes.

A key finding was that physicians in Switzerland have rapid and broad access to the diagnostic tools typically used to diagnose giant-cell arteritis. These include imaging modalities (MRI, ultrasound, and PET-CT) and temporal artery biopsy. Access to imaging for diagnosing giant-cell arteritis did not represent a barrier for most survey participants. In line with the EULAR recommendations, the ultrasound of the temporal and/or axillary arteries [3] is the most reported tool used to confirm a diagnosis of giant-cell arteritis with cranial involvement. About 8 in 10 participants reported planning this imaging technique in cases with suspected giant-cell arteritis with cranial involvement compared to half considering temporal artery biopsy. While ultrasound (musculoskeletal) is a key rheumatological competence, most specialists do not perform it themselves. Half of the participants stated they performed temporal artery biopsy only in cases with negative imaging results. This diagnostic approach contrasts with recent data from two French studies where temporal artery biopsy was performed in about 85%–90% of cases and ultrasound of temporal arteries in only one-third of cases [14, 15]. Ultrasound is possibly not as readily available in France. Spanish specialists involved in a cross-sectional survey in 2020 also considered temporal artery biopsy as the reference diagnostic test [16]. Interestingly, ultrasound of the temporal arteries was also the Swiss participants' second most frequent imaging technique after fluorine-18 fluorodeoxyglucose PET-CT of aorta/extracranial arteries in cases with suspected large vessel involvement. The prompt availability and absence of patient contraindications or potential risks make this diagnostic tool appealing. Indeed, ultrasound may be diagnostic in giant-cell arteritis patients even without typical cranial vasculitis signs [17].

Most participants reported using glucocorticoid monotherapy as induction-remission treatment, but only about half stated following the EULAR guideline's tapering scheme. Glucocorticoid-sparing agents (tocilizumab more often than methotrexate) are primarily prescribed to patients with relapsing disease or an increased risk of developing glucocorticoid-related side effects. Notably, most participants still used methotrexate as the glucocorticoid-sparing agent despite the availability of tocilizumab. This preference could be explained by rheumatologists' good knowledge of this drug, its ease of prescription, and its low cost. The observed predominant use of glucocorticoid monotherapy to induce disease remission and the willingness to limit the prescription of glucocorticoid-sparing agents to patients with a higher glucocorticoid exposure risk or experiencing a flare is consistent with other studies [14, 16].

After diagnosis, imaging was considered a tool to support treatment decisions mainly when structural damage (vas-

Table 3:
Main online survey results: imaging after diagnosis.

Question		Participants, n (%)	Missing (%)
After diagnosis, how often do you perform imaging to monitor structural damage (vascular thickening, stenosis, or dilatation)?	After 3, 6, 9, and 12 months, then yearly if in remission	1 (1)	3
	After 6 and 12 months, then yearly if in remission	13 (14)	
	After 12 months, then yearly if in remission	13 (14)	
	Every two years, if in remission	8 (9)	
	I do not follow a predefined follow-up scheme	50 (55)	
	None of the above; please specify	3 (3)	
Which imaging technique(s) do you mainly use to monitor vascular structural damage over time (vascular thickening, stenosis, or dilatation)?*	PET-CT of the aorta/extracranial arteries	9 (10)	1
	MRI of the aorta/extracranial arteries	52 (57)	
	Contrast-enhanced CT	10 (11)	
	Ultrasound for supra-aortic arteries and abdominal aorta and CT for the thoracic aorta	22 (24)	
	Other	7 (8)	
Do you routinely use imaging to guide your treatment strategy/Do you base your treatment strategy on imaging findings?	In patients treated with tocilizumab	8 (9)	4
	In all patients with large-vessel involvement before discontinuing treatment	17 (19)	
	I perform ultrasound or MRI before discontinuing treatment only in patients with temporal artery -giant-cell arteritis	3 (3)	
	No	34 (37)	
	Only in cases with suspected relapse	24 (26)	
	Other	1 (1)	
Apart from detecting structural vascular damage, does any other imaging finding drive your treatment decisions during follow-up?*	I plan a treatment escalation in cases with increased fluorodeoxyglucose uptake in the arterial wall at PET-CT	24 (26)	1
	I plan a treatment escalation in cases with inflammatory signs in the arterial wall at MRI	31 (34)	
	I plan a treatment escalation in cases with inflammatory signs in the arterial wall at CT	11 (12)	
	No, I only modify treatment in cases with the appearance/progression of signs of structural vascular damage	41 (45)	
	Other	3 (4)	

* More than one possible answer.

CT: computed tomography; MRI: magnetic resonance imaging; PET-CT: positron-emission-tomography-computed tomography.

cular thickening, stenosis, or dilatation) occurs or there is active vascular inflammation when a relapse is suspected. Which imaging technique should be used and how often it should be repeated over the giant-cell arteritis course is still being debated [3]. The absence of robust data explains the differing use of imaging during follow-up. Current evidence on the roles of imaging modalities for monitoring disease activity or outcome prediction is scarce [18]. Neither imaging findings at diagnosis nor over the disease course were found to predict disease relapse across published studies [18]. However, potential vascular complications, especially in patients with large vessel involvement, favour regular aortal imaging [19]. Research in this field is a critical unmet need that should be investigated with targeted studies.

Our study was not powered to detect significant differences between participants with different expertise in managing giant-cell arteritis patients. However, our findings suggest that 'more experienced' physicians more often follow the EULAR recommendations for glucocorticoid tapering and are less prone to systematically prescribe a glucocorticoid-sparing agent. The unavailability of long-term studies demonstrating the best scheme of glucocorticoid-sparing agents likely explained why one-third of participants, regardless of their patient volume and working setting, do not follow any predefined tapering scheme.

This study had some limitations. First, the inclusion of participants from other specialties could have led to different and more generalizable results. Second, the definition of 'expertise' based on the number of patients with giant-cell arteritis treated per year does not fully capture the participants' experience or knowledge about the best disease management approach. Furthermore, using the snowball technique prevented us from calculating the participation rate, and heterogeneity within centres could not be explored due to the small sample size. Finally, we did not explore the prescription of bone protection medications in patients chronically treated with steroids. Readers should be aware of such limitations.

In conclusion, our survey allowed us to characterize better the current approaches in diagnosing and treating giant-cell arteritis patients in Switzerland. Regarding diagnosis, the main points of interest are the ease of obtaining imaging for giant-cell arteritis patients with both cranial and large vessel involvement, general satisfaction with the way temporal artery biopsy is performed, and the wide use of ultrasound on temporal arteries. Regarding treatment, most participants use glucocorticoid monotherapy as induction-remission treatment, with glucocorticoid-sparing agents, mostly tocilizumab, prescribed in cases with relapsing disease or to minimize steroid exposure in patients with contraindications to glucocorticoid or at higher risk of corticosteroid-related complications. We have highlight-

Figure 1: The proportions of participants (a) tapering glucocorticoids according to EULAR recommendations [2], (b) prescribing a glucocorticoid-sparing agent to every giant-cell arteritis patient, (c) not following any prespecified tapering scheme for glucocorticoid-sparing agents, or (d) not prescribing antiplatelet agents for giant-cell arteritis. Results are shown according to the participants' expertise (purple bars) or setting (academic, nonacademic hospital, private practice; yellow bars).

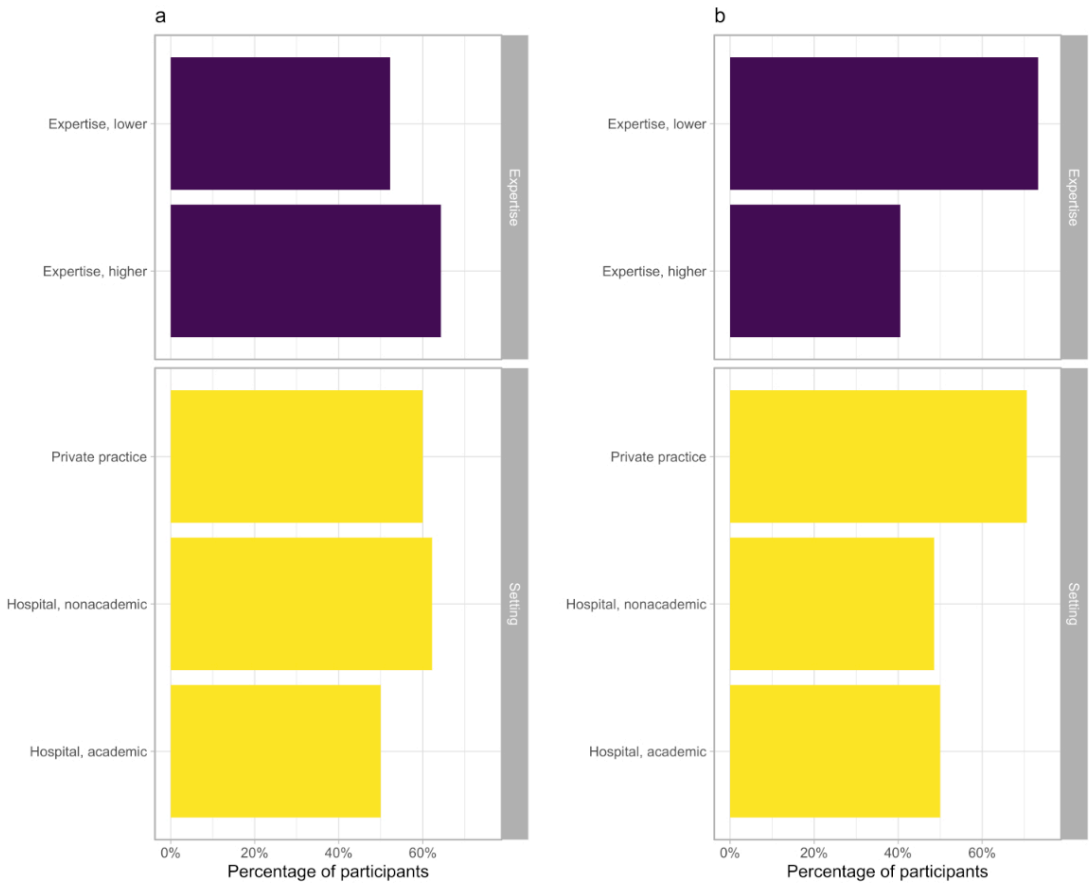
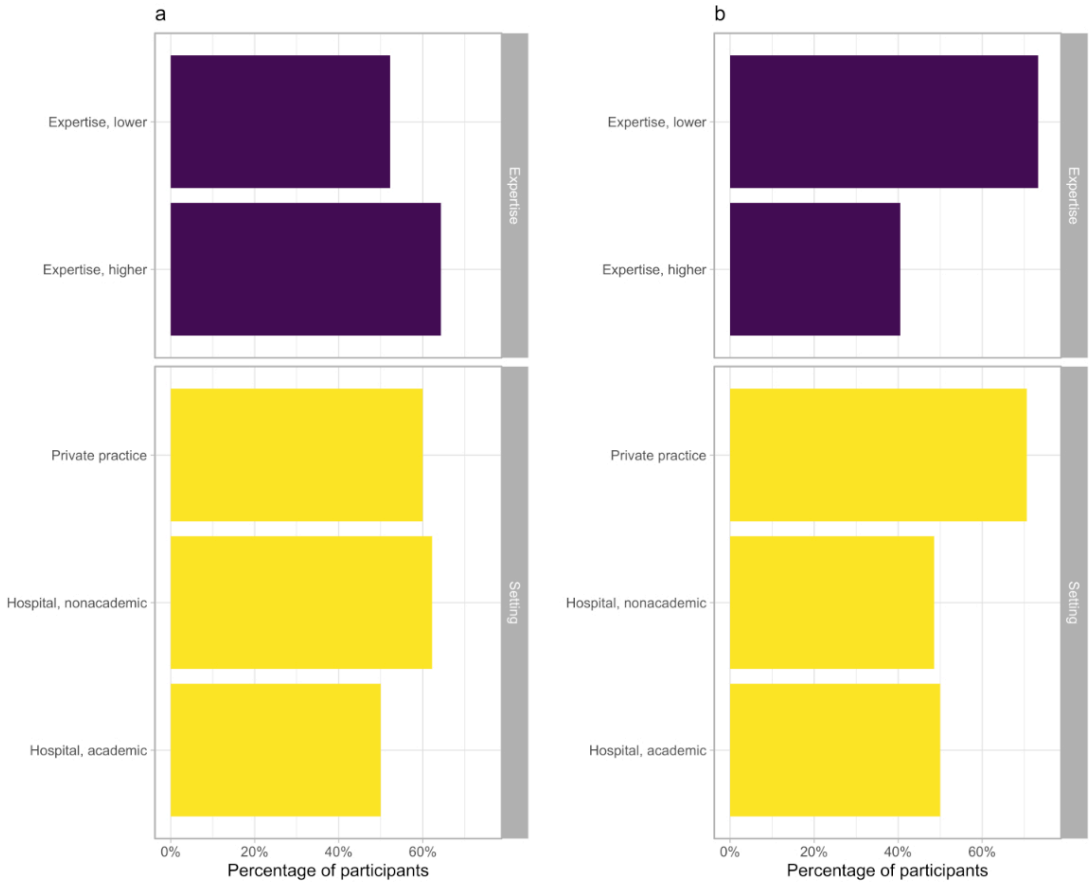


Figure 2: The proportions of participants (a) using MRI to monitor vascular structural damage or (b) not following any prespecified scheme to perform imaging after diagnosis.



ed a relatively high variability in how glucocorticoid and glucocorticoid-sparing agents have been used over time. Regarding imaging, identifying and monitoring structural damage (vascular thickening, stenosis, or dilatation) and detecting active inflammation signs (in relapsing patients) are the leading drivers of treatment decisions. However, there remains very poor agreement about how imaging should be planned over the giant-cell arteritis course.

The heterogeneity in managing giant-cell arteritis reflects existing gaps in research and, to some extent, different physician experiences. Regular updated national recommendations may be helpful in broadly disseminating recent developments and their implications on daily practice. Treatment intensity, prognostic factors, the value of imaging for defining active vs inactive disease, and the way patients should be followed for structural vascular complications must be studied in prospective cohorts. One such longitudinal cohort is the Giant-Cell Arteritis and Polymyalgia Rheumatica Module of the Swiss Cohort Quality Management, established in 2020. Finally, a Swiss association for the study of vasculitides (VASAS, vasas.ch), has been recently created to foster research in this field and promote knowledge of these life-threatening diseases among patients and physicians.

Data availability statement

The data supporting this study's findings are available upon reasonable request.

Acknowledgements

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Authors contribution: All the authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final published version. MI and TD had full access to all study data and take responsibility for its integrity and the accuracy of its analysis.

Study conception and design: MI, AKH, MS, and TD.

Data acquisition: MI, AKH, MS, DSC, SA, MOB, CTB, DD, AF, AM, TN, SR, CR, LS, PV, LW, and TD.

Data analysis and interpretation: MI, AKH, MS, DSC, SA, MOB, CTB, DD, AF, AM, TN, SR, CR, LS, PV, LW, and TD.

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Potential conflicts of interest

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