The incidence of primary large vessel vasculitis in Norfolk, UK from 2011-2020

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Abstract

Objectives

To report the annual incidence of primary large vessel vasculitis (LVV) in the adult population of Norfolk County, UK, including giant cell arteritis (GCA) (in those ≥50 years) and Takayasu arteritis (TAK).

Methods

Individuals diagnosed by histology or imaging who lived in NR1-NR30 postcode districts were included. Validated criteria from 1990 and 2022 were applied for final classification. Population data was available from the office of national statistics, UK.

Results

270 individuals were diagnosed with primary LVV over 4.7 million person-years. The annual incidence (95% confidence interval (CI)) of primary LVV was 57.5 (50.8, 64.7) / million person-years in the adult population. 227 and 244 individuals were diagnosed with GCA over ~2.5 million person-years using 1990 and 2022 criteria respectively. The annual incidence (95% CI) of GCA was 91.6 (80.0, 104.3) / million person-years aged ≥50 years using 1990 criteria and 98.4 (86.4, 111.6) /million person-years aged ≥50 years using 2022 criteria. 13 and 2 individuals were diagnosed with TAK over 4.7 million person-years. The annual incidence (95% CI) of TAK was 2.8 (1.5, 4.7) / million person-years using 1990 criteria and 0.4 (0.0, 1.4) / million person-years using 2022 criteria, in the adult population. The incidence of GCA rose sharply in 2017 co-incident with the introduction of a fast-track pathway and fell during the pandemic when the pathway was disrupted.

Conclusions

This is the first study that reports the incidence of objectively verified primary LVV in the adult population. The incidence of GCA may be affected by the availability of diagnostic pathways. The use of the 2022 classification criteria results in a rise in the classification of GCA and fall in that of TAK.

Introduction

Giant cell arteritis (GCA) and Takayasu arteritis (TAK) are distinct vasculitis syndromes which predominantly affect large vessels (1). Classification criteria for GCA and TAK were promulgated by the American College of Rheumatology (ACR) in 1990 (2, 3). These have become progressively outmoded with improved diagnostic modalities and consequently the classification criteria have been revised in 2022 (4, 5). The incidence of GCA has been studied extensively in Northern European populations over the age of 50 (6). There have been differences in the methodologies of these studies. Studies where the case definitions were based on diagnostic codes from administrative datasets, classification criteria, or typical signs and symptoms typically reported higher incidence than those studies which have based the case definition on temporal artery biopsy (TAB). For example, two studies from Sweden – one based on presence on typical signs and symptoms and the other based on temporal artery biopsy reported annual incidence (per million population of age ≥50) of 336 and 141 respectively (7, 8). From Norway, two studies reported annual incidence (per million population of age ≥50) using diagnostic codes and classification criteria of 167 and 290 respectively (9, 10). The incidence reporting of TAK has been considerably heterogenous due to differences in methodology as well as real differences in populations. In their meta-analysis of 11 studies, Rutter et al calculated the heterogeneity between the studies and estimated the I^2 statistic to be 96% (11). This value describes the percent of variance related to biases rather than by chance. Differences in case definitions (diagnostic codes vs. classification criteria), populations (single centre vs. population data), study designs (prospective vs. retrospective) all contributed to this. The application of classification criteria for diagnostic purposes has sometimes meant that objective clinical diagnosis has not been pursued (12). The use of coding in routinely administered datasets without objective verification of diagnosis leads to overestimation of the incidence and has been the main source of estimates about GCA in the UK (13). There are no data on the incidence of primary LVV in a population.

Our centre provides secondary healthcare to a stable population and has been the seat of epidemiology studies in vasculitis and rheumatoid arthritis in the UK since 1990 (14, 15). This has led to the development of nationally recognised vasculitis service provision (16). A mature vasculitis service allowed us to address the question of the incidence of all primary LVV in a stable population of predominant Northern European ancestry in Norfolk, UK. The primary aim of this study was to report the annual incidence of primary LVV including TAK in the adult population, and GCA in those over the age of 50. Secondary aims included the effect of the new classification criteria on the incidence of the classification labels, and the effect of the fast-track ultrasonography led pathway on incidence of GCA.

Methods

Population

The city of Norwich serves as the post town for UK postcodes beginning with the prefix NR. The NR postal area has 30 districts (NR1 to NR30) contained within the boundaries of the county of Norfolk. The population of these 30 districts served as our denominator. Postcode specific data was available from the 2011 census. Specific data for each year of the decade was also available for the county of

Norfolk. Using these data, we were able to estimate the population resident in the 30 districts (Table 1). Data from the Office of National Statistics, UK (https://bit.ly/3INEyuT) allows comparison of the self-declared ethnicity of the population of Norfolk between the 2011 and 2021 census. The 'White' population fell from 96.5% to 94.7% and the 'Asian' population rose from 1.5% to 2.1%.

Table 1 Population of NR1 to NR30 from 2011 to 2020 by age bands and gender

Year	Females ≥18 years	Males ≥18 years	Total ≥18 years	Females ≥50 years	Males ≥50 years	Total ≥50 years
2011	234,529	219,786	454,315	122,485	108,427	230,912
2012	235,866	221,461	457,327	124,096	110,214	234,310
2013	237,309	223,108	460,417	125,612	112,017	237,630
2014	239,244	225,263	464,507	127,524	114,167	241,690
2015	241,289	227,365	468,653	129,530	116,347	245,877
2016	243,050	229,362	472,412	131,577	118,447	250,024
2017	245,125	231,005	476,130	133,625	120,519	254,144
2018	246,700	232,379	479,078	135,639	122,256	257,895
2019	248,005	233,123	481,128	137,543	124,192	261,736
2020	249,829	235,066	484,895	139,324	125,975	265,299
Total	2,420,946	2,277,916	4,698,862	1,306,954	1,172,563	2,479,517

Cases

The population of interest is served by one LVV service with integration from ophthalmology and with provision for nuclear medicine, ultrasonography and histopathology (17). We prospectively maintain a register as part of our requirement as a centre providing specialised services to allow quarterly data returns to NHS England. A definite diagnosis of LVV is made using either ultrasonography, 18-fluorodeoxyglucose (FDG) positron emission tomography (PET) computed tomography (CT), or TAB. Following a diagnosis of vasculitis, classification criteria are routinely applied to reach a final diagnostic label.

Objective diagnosis

All individuals were diagnosed objectively as having primary LVV prior to application of classification criteria. Ultrasonography demonstrating concentric, hypoechoic thickening of the large vessel in longitudinal and transverse planes was considered positive (18). A temporal artery biopsy demonstrating intramural inflammation was considered positive. Degenerative changes suggestive of 'healed arteritis' were not considered to be positive for GCA (19). 18-FDG labelled PET CT scanning demonstrative of increased FDG uptake in the walls of the large vessels was considered positive (20). In all cases, the positive test result was considered diagnostic only in the presence of clinical suspicion of LVV.

Classification criteria

During the time frame of interest, the only validated criteria for the classification of primary systemic vasculitis were those developed in 1990 (2, 3). We have modified some domains of the 1990 criteria to make them applicable for current use as follows – temporal artery abnormality was modified to cranial artery abnormality to include tenderness, thickening or decreased pulse of the facial and occipital arteries in addition to the superficial temporal artery. Elevated C-reactive protein (CRP) ≥20 mg/L was accepted instead of or in addition to an elevated erythrocyte sedimentation rate (ESR) ≥50

mm (21). Ultrasonography demonstrating a halo sign in at least two cranial arteries was acceptable instead of a temporal artery biopsy (22). Decreased radial pulse was acceptable instead of decreased brachial pulse. A bruit over the axillary artery was acceptable in lieu of subclavian artery bruit. 18-FDG PET CT demonstrative of increased radioisotope uptake in aorta, or ultrasonography demonstration of extracranial vasculitis were preferred as evidence of arteriographic abnormality. After we completed our project, the new classification criteria were published (4, 5). We have retrospectively applied the new criteria to our cohort. If criteria for both GCA and TAK were met, GCA was preferred as a diagnosis in those ≥50 years and Takayasu in those who were <50 years.

Outcomes

The outcomes of interest were a) the annual incidence of all primary LVV in population ≥18 years, b) the annual incidence of GCA in the population ≥50 years, c) the annual incidence of TAK in population ≥18 years, d) the effect of the new classification criteria on the incidence of the different large vessel vasculitides. We used an age cut-off of 50 years for GCA to enable ready comparison with previous studies which generally use this age band.

Statistics

The demographics of the cohort were explored using SPSS version 28. The effect of classification was studied using a Sankey graph, created on JSFiddle.net. The incidence and confidence intervals were calculated on Microsoft Excel. Assuming Poisson distribution the incidence i was calculated using the formula $i = n/e$ where n was the number of events and e was the exposure in person-years. The 95% confidence intervals were calculated in Microsoft Excel using the Byar's approximation for a Poisson distribution using the formula $i_{lower} = n(1 - \frac{1}{9n} - \frac{z}{3\sqrt{n}})^3$ and $i_{upper} = (n+1)(1 - \frac{1}{9(n+1)} + \frac{z}{3\sqrt{n+1}})^3$, where z was the value at the 97.5 percentile, accepted to be 1.96, i_{lower} and i_{upper} were the 95% confidence intervals (formulae available from Public Health England https://bit.ly/42eqO3A, accessed on May 8, 2023).

Patient and Public Involvement

There was no direct patient involvement in this project. However, the start of this project was guided by a direct question from a patient who wondered how many people with her condition existed in our county. There were two virtual meetings with 2 patients with GCA to understand what would have helped them at the start of their patient journey. We have worked closely with patient charities in the past on other projects and will send the published manuscript to PMRGCA UK for dissemination to their membership.

Results

Between 2011 to 2020, 270 individuals were diagnosed with primary LVV. 180 were female. The mean (standard deviation (SD)) age was 74.2 (8.6). The age, mean (SD), gender, clinical and laboratory features of the cases is as in Table 2. 179 were diagnosed on ultrasonography, 70 with a temporal artery biopsy and 21 on an 18-FDG PET CT scan.

Table 2 Age, Gender, Clinical Features, and laboratory features of the cases (For interpretation of diagnostic modality positivity, it should be recognised that where the modality was not positive, the test may not have been done) (GCA – Giant cell arteritis; TAK – Takayasu arteritis; LVV – Large vessel vasculitis; SD – standard deviation; ESR – erythrocyte

sedimentation rate; CRP – C-reactive protein; FDG-PET-CT – Fluorodeoxyglucose Positron emission tomography Computed tomography)

	GCA (1990 criteria)	GCA (2022 criteria)	TAK (1990 criteria)	TAK (2022 criteria)	All primary LVV
N	227	244	13	2	270
Age (Mean (SD))	75.4 (7.4)	75.1 (7.7)	66.9 (8.9)	52.1 (3.1)	74.2 (8.6)
Age <40 (N)	0	0	0	0	1
Age ≥50 (N)	227	244	12	1	268
Gender (F/M)	149/78	161/83	11/2	2/0	180/90
New headache	190	190	0	0	190
Limb claudication	2	6	9	2	12
Cranial artery abnormality	90	90	0	0	91
Blood pressure discrepancy	1	2	3	0	4
Pulse discrepancy	2	4	7	2	9
Bruit	35	40	7	0	50
ESR >50 and/or CRP >20	200	211	7	0	228
TAB positive	68	69	0	0	70
Ultrasonography					
• Cranial artery involvement	139	142	0	0	142
• Extracranial artery involvement	45	54	7	2	67
18-FDG PET CT positive	4	9	6	0	21

Incidence

The person-years exposure in the 30 postcode districts of interest in Norfolk County between 2011 to 2020 was 4,698,862. 2,420,946 were female person-years and 2,479,517 person-years were for those ≥50 years. The annual incidence of primary LVV and that of GCA and TAK by their specific classification is given in Table 3.

Table 3 Incidence of primary LVV by specific classification groups in Norfolk, UK (GCA – giant cell arteritis)

Classification	Females			Males			Total		
	N	Exposure (person-years)	Incidence (95% CI)	N	Exposure (person-years)	Incidence (95% CI)	N	Exposure (person-years)	Incidence (95% CI)
Large Vessel Vasculitis (per million population ≥18)	180	2,420,946	74.4 (63.9, 86.0)	90	2,277,916	39.5 (31.8, 48.6)	270	4,698,862	57.5 (50.8, 64.7)
GCA (1990 ACR) (per million ≥50)	150	1,306,954	114.8 (97.1, 134.7)	77	1,172,563	65.7 (51.8, 82.1)	227	2,479,517	91.6 (80.0, 104.3)
Takayasu (1990 ACR) (per million population ≥18)	11	2,420,946	4.5 (2.3, 8.1)	2	2,277,916	0.9 (0.1, 3.2)	13	4,698,862	2.8 (1.5, 4.7)
GCA (2022 ACR/EULAR) (per million population ≥50)	162	1,306,954	124.0 (105.6, 144.6)	82	1,172,563	69.9 (55.6, 86.8)	244	2,479,517	98.4 (86.4, 111.6)
Takayasu (2022 ACR/EULAR) (per million population ≥18)	2	2,420,946	0.8 (0.1, 3.0)	0	2,277,916	0	2	4,698,862	0.4 (0.0, 1.5)

Classification

Using the 1990 ACR classification criteria, the classification was ambiguous for 32 individuals – 30 individuals remained unclassified and two met both sets of criteria for GCA and Takayasu. Both individuals who met two sets of criteria were finally diagnosed as having GCA by virtue of being >50 years of age. Using the 2022 ACR/EULAR classification criteria, the classification was ambiguous for 27 individuals – 24 individuals remained unclassified and three met both sets of classification. All three were finally diagnosed as having GCA because they were older than 50 years. The effect of the 2022 classification criteria in changing the classification label is presented in Figure 1 and Supplementary Table 1.

GCA incidence by year of diagnosis

The incidence of GCA varied through the years (Table 4). The annual incidence per million population ≥50 years for GCA (1990 ACR) was lowest in 2015 at 44.7 (95% CI 22.3, 80.1) and highest in 2019 at 164.3 (95% CI 118.9, 221.3). For GCA (2022 ACR/EULAR), it was lowest in 2015 at 52.9 (95% CI 28.1, 90.4) and highest in 2019 at 183.4 (95% CI 135.2, 243.2).

Table 4 Incidence of GCA by year of diagnosis (GCA – giant cell arteritis; ACR – American college of rheumatology; EULAR – European alliance of associations for rheumatology)

Year	Exposure (person-years)	GCA 1990 ACR		GCA 2022 ACR/EULAR	
		N	Incidence/million (95% CI)	N	Incidence/million (95% CI)
2011	230,912	14	60.6 (33.1, 101.7)	14	60.6 (33.1, 101.7)
2012	234,310	13	55.5 (29.5, 94.9)	13	55.5 (29.5, 94.9)
2013	237,630	14	58.9 (32.2, 98.9)	17	71.5 (41.7, 114.5)
2014	241,690	21	86.9 (53.8, 132.8)	22	91.0 (57.0, 137.8)
2015	245,877	11	44.7 (22.3, 80.1)	13	52.9 (28.1, 90.4)
2016	250,024	16	64.0 (36.6, 103.9)	17	68.0 (39.6, 108.9)
2017	254,144	29	114.1 (76.4, 163.9)	30	118.0 (79.6, 168.5)
2018	257,895	39	151.2 (107.5, 206.7)	40	155.1 (110.8, 211.2)
2019	261,736	43	164.3 (118.9, 221.3)	48	183.4 (135.2, 243.2)
2020	265,299	27	101.8 (67.1, 148.1)	30	113.1 (76.3, 113.1)

GCA incidence by decade of life

The incidence of GCA rises steadily in those over 50 years of age, peaking in the 9th decade with an annual incidence (95% CI) of 190.4 (144.9, 245.6) by the 1990 ACR criteria, and 203.3 (156.2, 260.1) by the 2022 ACR/EULAR criteria (Table 5).

Table 5 Incidence of GCA by age (GCA- giant cell arteritis; ACR – American college of rheumatology; EULAR – European alliance of associations for rheumatology)

Age band	Person-years	GCA (1990 ACR) annual incidence / million (95% CI)	GCA (2022 ACR/EULAR) incidence / million (95% CI)
50-59	769,996	5.2 (1.4, 13.3)	10.4 (4.5, 20.5)
60-69	748,916	65.4 (48.4, 86.5)	72.1 (54.2, 94.1)
70-79	582,258	187.2 (153.7, 225.8)	194.1 (159.9, 233.3)
80-89	309,868	190.4 (144.9, 245.6)	203.3 (156.2, 260.1)
≥90	68,479	87.6 (32.0, 190.7)	87.6 (32.0, 190.7)

Discussion

This is the first study that reports the incidence of all primary LVV in a population. Systematic reviews report the annual incidence of GCA (in those ≥50 years) and TAK to be 100.0 (95% CI 92.2, 107.8) per million population and 1.1 (95% CI 0.7, 1.8) per million, respectively (11, 23). Data from the UK General practice research database reports the annual incidence of GCA (in those ≥50 years) and TAK to be 220 (95% CI 210, 230) per million population and 0.8 (95% CI 0.4, 1.3) per million, respectively (13, 24). The use of diagnostic coding for epidemiologic studies is fraught with problems. Smeeth et al found that the diagnostic codes were poorly supported by objective diagnosis (13). To validate their results, they audited 50 sets of notes. Of the 45 available, 5 had a recorded result for a temporal artery biopsy of which 2 were negative. A result for ESR was available only in 29/45. In 4/45, even the notes did not support a clinical diagnosis of GCA. The use of diagnostic codes in administrative datasets to study epidemiology will result in an overestimation of the incidence. Our calculated annual incidence for GCA of 91.6 (95% CI 80.0, 104.3)/million (using 1990 criteria) and 98.4 (95% CI 86.4, 111.6)/million (using 2022 definitions) are comparable to those reported in the metanalysis by Li et al (23). The incidence of TAK in our paper is higher than previously reported if the 1990 ACR criteria are followed but become comparable to published literature when the 2022 criteria are observed.

Our study has several strengths. We work in an integrated vasculitis service with provision for ultrasonography, PET CT scanning and histopathology. Every single case has an objectively made diagnosis based on tissue or imaging in the appropriate clinical context. The study area has a stable population which is the seat of epidemiology registers (14, 15). We also acknowledge the limitations of our work. Despite a mature vasculitis service, there are invariably going to be individuals with LVV who have been treated empirically with prednisolone either in primary or secondary care and an objective diagnosis has not been sought. This is especially true for the years when we did not have a fast-track pathway. This means that the figures that we present here, are likely to be an underestimate.

We observed an increase in the incidence of GCA following our introduction of a fast-track ultrasonography led diagnostic pathway for LVV in 2017 after a formal period of validation against long-term outcomes (25). Table 4 demonstrates a significant rise in the incidence of GCA in that year. The increased incidence may be due to improved recognition in primary care and referral to our service. As information about the newer pathway became known, the incidence of newly diagnosed GCA kept increasing in 2018 and 2019. The drop in incidence in 2020 may reflect the diversion of manpower and resources to deal with the SARS COV 2 pandemic (CBM, FLC, SF, CYY were seconded to COVID in-patient work) resulting in fewer patients being able to access our services. Our findings are similar to that of Monti et al (26) who saw a drastic drop in the request for fast-track assessments during the pandemic. In centres where the pandemic did not result in a diversion of resources, the incidence was either not affected, or marginally higher (27). We accept that in both fluctuations, post hoc does not mean propter hoc.

We recognise that our work does not include ethnicity data. The county of Norfolk is 94.7% white. Ethnicity is a complex social construct that includes biology, but also history, culture, language, religion and lifestyle (28). We recognise that all those factors influence health and access to healthcare but are beyond the remit of this paper. Another limitation of our work is that we have only chosen to include only primary large vessel vasculitis. Individuals with IgG4 related disease, Behcet's disease, axial spondyloarthritis, relapsing polychondritis and other causes of LVV related to another known

autoimmune / autoinflammatory aetiology have not been considered. It is common practice for individuals with polymyalgia rheumatica to be investigated for large vessel vasculitis whenever we can see them in a steroid naïve state. But it is very likely that empirical treatment with glucocorticoid therapy in this subgroup of individuals will lead to an underestimation of the incidence of primary LVV.

We have had to modify the 1990 ACR criteria because of changes in practice and diagnostics. Ultrasonography and 18-FDG PET scanning have replaced conventional angiography. ESR has fallen into disuse and most hospitals now prefer measuring the CRP. There is evidence that CRP is more sensitive than ESR for a diagnosis of GCA (29). We had to decide on the threshold value of CRP which might be comparable to an ESR of 50mm. Hayreh et al had demonstrated that a ESR of 47mm was comparable to a CRP of 24.5 mg/L in the context of GCA (21). Park et al demonstrated in their cohort of GCA that an ESR of 35.4mm was comparable to a CRP of 11.1 mg/L (30). We took a pragmatic decision to put our CRP threshold at 20 mg/L. Since we began our work, Kermani et al have estimated the optimal cut-off for CRP to be 26.9 mg/L (31) and the 2022 ACR/EULAR classification criteria have estimated the cut-off for CRP to be 10 mg/L (4).

The new classification criteria have not made a huge difference to the incidence of GCA, but TAK has become rarer. Using the 1990 ACR classification criteria – 15 individuals met the criteria for TAK. Of those, two also met the classification for GCA and were classified as GCA because of their age. Of the 13 with a final diagnosis of Takayasu, the application of the 2022 classification has resulted in four being reclassified as GCA and nine have become unclassified LVV (Figure 1). The objective of classification criteria is to reduce ambiguous labelling by minimising the number of cases meeting either none or both sets of criteria. In that sense, the 2022 criteria have resulted in improved labelling for 5/270 (1.9%) cases. The main reason for the reclassification of the nine TAK cases was because of the mandatory age criteria in the 2022 TAK criteria. All nine were above 60 years of age. The entity of isolated aortitis also sits within the spectrum of primary LVV. No classification criteria or agreed definitions exist for this. We have been unable to formally use that classification label, but we think that about half of our 18-FDG-PET scan positive patients (N=21) may fit that description. For example, the one person below 40 years of age (Table 2) presented with weight loss, abdominal pain, CRP of 15 mg/L and a positive 18-FDG PET CT scan showing aortic uptake only.

In a retrospective study of TAK in Korea, 25% of individuals appear to have presented after the age of 60 (32). When identical anatomical tropism for vasculitis was seen in Italy, they have chosen to label the disease GCA (33). Muratore et al reported a study of GCA from Italy of 207 individuals with a diagnosis of GCA. 53 (25%) of them had no cranial arterial involvement and were diagnosed with only involvement of the great vessels. They did not comment on how many of those 53 met the classification criteria for TAK. Could this mean that the use of disease labels depends on the bias of clinicians? If seen in an Asian context, clinicians maybe more likely to use the label of Takayasu disregarding the age of presentation. If seen in a European context, clinicians maybe more likely to use the label of GCA, disregarding the phenotype of the disease. There is evidence that GCA and TAK have shared as well as divergent arterial tropism and may represent a disease spectrum (34). With that in mind, we have reported a unified incidence figure for all primary LVV. We do not know the relevance of this figure outside of our geographical area. We would hope to collaborate with colleagues in Asia or Turkey where the phenotype of TAK is more common than GCA to compare incidence figures of all primary LVV. If we find that the incidence is comparable, but the phenotypes

are different – we may be able to understand both diseases better. Such a strategy has worked well for us with understanding ANCA associated vasculitis (36).

Competing Interests

None pertaining to this manuscript.

Contribution

Study concept and design – CBM and RAW

Data acquisition – CBM, CB, FLC, GD, SF, KS, CYY

Data analysis – CBM, RAW

Initial draft of manuscript – CBM, RAW

Edits and final approval of manuscript – all authors

Acknowledgements

The ultrasonography machine used for diagnostics of the patients described in the study was donated by Norfolk & Norwich Hospitals Charity (Reg Charity 1048170). Parts of this manuscript have been presented at the British Society for Rheumatology annual conference in 2022 (37) and 2023 (38, 39), European Alliance of Associations for Rheumatology annual conference in 2022 (40). The incidence data and the effect of classification criteria have been accepted as abstracts at the European Alliance of Associations for Rheumatology annual conference in 2023.

Funding

CM is funded 1 day a week to do research by the National Health Service.

Ethical approval

No ethical approval was needed for this study because it is a report of the numbers of patients under our care and we are required to hold and submit this information to NHS England. The decision tool designed by the NHS Health Research Authority did not consider this to be research needing an ethics application.

Data sharing

Reasonable requests for data will be entertained by writing to the corresponding author.

Key messages

What is already known on this topic?

- The annual incidence of GCA is thought to be 100.0 (95% CI 92.2, 107.8) per million population ≥ 50 years of age (23)
- The annual incidence of TAK is thought to be 0.8 (95% CI 0.4, 1.3) per million (11)
- There is significant heterogeneity in the reported studies with differing reliability in case ascertainment.
- We did not know the incidence of large vessel vasculitis in a population. We did not know the effect of fast-track pathways on the incidence of GCA. We did not know the effect of the new classification criteria on a cohort of individuals with primary LVV.

What this study adds

- This is the first report of the incidence of primary LVV in an adult population – 57.5 (95% CI 50.8, 64.7)
- The improvement in case ascertainment using ultrasonography results in a rise in the incidence suggesting that these individuals may have been treated empirically without adequate diagnostic work-up.
- The new classification criteria have meant that TAK has become an even rarer diagnosis, with some previous diagnoses of TAK being relabelled as GCA.

How this study might affect research, practice, or policy

- The knowledge of the incidence of primary LVV will assist in the planning of service delivery including making a case for building improved diagnostics e.g., fast-track ultrasonography pathways.
- GCA and TAK might be part of a disease spectrum instead of being distinct diseases, making an argument for future research including patients by anatomical tropism rather than classification criteria.
- Our study provides evidence for maintaining the availability of diagnostics for rare and serious conditions to be future proofed against shocks like the pandemic.

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Figure 1 Sankey graph demonstrating the effect of classification criteria on our cohort of 270 individuals with objectively diagnosed LVV