

3D-printed wrist orthosis for carpal tunnel syndrome

Submission date 28/11/2025	Recruitment status Recruiting	<input checked="" type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 28/11/2025	Overall study status Ongoing	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
Last Edited 28/11/2025	Condition category Nervous System Diseases	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

This study is exploring a new way to make orthoses using 3D printing technology. These supports are used to help people with a condition called carpal tunnel syndrome, which causes pain, numbness, and tingling in the hand and fingers due to pressure on the median nerve. Although 3D printing has many advantages over traditional methods, it's not yet commonly used in clinics. The aim of this study is to see how acceptable and useful 3D-printed orthoses are for patients and healthcare professionals.

Who can participate?

Adults aged 18 years and over who have a carpal tunnel syndrome can take part in the study. Both men and women will be included, and participants will be recruited from different healthcare centres.

What does the study involve?

Participants, if interested, will receive a phone call to verify their eligibility. If eligible, patients will meet with the research assistant, who will scan the affected upper limb. After modeling, the orthosis will be 3D-printed and sent to the patient. They will be asked to fill out questionnaires about their pain and hand function at five different times: before wearing the orthosis, and then 24 hours, 1 week, 1 month, and 2 months after starting to wear it. All questionnaires can be completed from home using a phone or computer.

What are the possible benefits and risks of participating?

Participants may benefit from reduced pain and improved hand and wrist function thanks to the orthosis. However, wearing it might be uncomfortable and could cause skin irritation or pain due to limited wrist movement. The study also requires some time commitment—about 30 minutes online and around 15 minutes to complete questionnaires at each of the five time points.

Where is the study run from?

Université du Québec à Trois-Rivières (UQTR) (Canada)

When is the study starting and how long is it expected to run for?

The study started in June 2025 and is expected to run until December 2026.

Who is funding the study?
Université du Québec à Trois-Rivières (UQTR) (Canada)

Who is the main contact?
Tokiko Hamasaki, tokiko.hamasaki@uqtr.ca

Contact information

Type(s)

Principal investigator

Contact name

Ms Tokiko Hamasaki

ORCID ID

<https://orcid.org/0000-0002-9514-0676>

Contact details

555 Boulevard de l'Université, Bureau 2021
Drummondville
Canada
J2C 0R5
+1 (0)819-478-5011, 2903
tokiko.hamasaki@uqtr.ca

Type(s)

Scientific

Contact name

Mr Stéphane Bedwani

ORCID ID

<https://orcid.org/0000-0002-1057-9883>

Contact details

1000 rue St-Denis, DS350-DS450
Montréal
Canada
H2X OC1
+1 (0)514-890-8000, ext 11126
stephane.bedwani.chum@ssss.gouv.qc.ca

Type(s)

Public

Contact name

Mr William Beauchemin

Contact details

850 Boulevard de Maisonneuve Est, 3e-4e étages
Montréal
Canada
H2L 4L8
+1 (0)514 623 4531
william.beauchemin@umontreal.ca

Additional identifiers

Study information

Scientific Title

Proof of concept: confection wrist orthoses for carpal tunnel syndrome using 3D printing

Acronym

3DP

Study objectives

This project aims to evaluate whether 3D-printed orthosis is acceptable in a clinical setting, both for professionals and for patients with carpal tunnel syndrome. This technology, which is still rarely used in this field, could offer practical and clinical advantages over traditional methods.

Ethics approval required

Ethics approval required

Ethics approval(s)

approved 13/11/2025, Comité d'éthique de la recherche du CIUSSS de la Mauricie-et-du-Centre-du-Québec (2700, boulevard des Forges, bureau 302, Trois-Rivières, G8Z 1V2, Canada; +1 (0)819 372-3133, poste 32303; 04ethiqueciusssmcq@ssss.gouv.qc.ca), ref: MP-29-2026-896, 1026

Primary study design

Interventional

Allocation

Non-randomized controlled trial

Masking

Open (masking not used)

Control

Active

Assignment

Crossover

Purpose

Treatment

Study type(s)

Health condition(s) or problem(s) studied

Carpal tunnel syndrome of the wrist

Interventions

The study design is semi-experimental; thus, there is no randomization, and there is only one arm for which the treatment is a 3D-printed orthosis. Every participant will wear the 3D orthosis and the thermoformed orthosis (control). They will wear each orthosis for a total of 2 months. The participants will answer a questionnaire assessing their symptoms before wearing the orthosis and questionnaires about the orthosis 24 hours, 1 week, 1 month and 2 months after beginning to wear the orthosis. They will not wear the 3D orthosis and the thermoformed orthosis at the same time.

Intervention Type

Procedure/Surgery

Primary outcome(s)

1. Pain and upper limb function measured using 0-10 rating scale for pain at at the start of the study and after beginning to wear the orthosis at multiple intervals (24 hours, 1 week, 1 month, 2 months)
2. Upper limb function measured using QuickDASH questionnaire at at the start of the study and after beginning to wear the orthosis at multiple intervals (24 hours, 1 week, 1 month, 2 months)

Key secondary outcome(s)

1. User satisfaction measured using QUEST 2.0 questionnaire at after beginning to wear the orthosis at multiple intervals (24 hours, 1 week, 1 month, 2 months)

Completion date

01/12/2026

Eligibility**Key inclusion criteria**

1. The patient must be 18 years or older
2. The patient must have a carpal tunnel syndrome of the wrist
3. The patient must be able to read, write and answer the questionnaires

Healthy volunteers allowed

No

Age group

Mixed

Lower age limit

18 years

Upper age limit

100 years

Sex

All

Total final enrolment

0

Key exclusion criteria

1. The patient is already wearing an orthosis
2. The patient received a cortisone injection in the last 4 months
3. The patient received surgery for this condition

Date of first enrolment

05/12/2025

Date of final enrolment

01/10/2026

Locations

Countries of recruitment

Canada

Study participating centre

CHUM

1000 Saint Denis St

Montreal

Canada

H2X 0C1

Study participating centre

Clinique Multidisciplinaire en Santé de l'UQTR

Pavillon de la Santé, Local 2827

Trois-Rivières

Canada

G9A 5H7

Study participating centre

CBI Santé - Trois-Rivières

1785 Bd du Carmel local 103

Trois-Rivières

Canada

G8Z 3R8

Study participating centre

Centre hospitalier affilié universitaire régional de Trois-Rivières
1991 Bd du Carmel
Trois-Rivières
Canada
G8Z 3R9

Sponsor information

Organisation

Centre Hospitalier de l'Université de Montréal

ROR

<https://ror.org/0410a8y51>

Organisation

Université du Québec à Trois-Rivières

ROR

<https://ror.org/02xrw9r68>

Funder(s)

Funder type

Funder Name

Université du Québec à Trois-Rivières

Alternative Name(s)

Universidad de Quebec en Trois-Rivières, UQTR

Funding Body Type

Private sector organisation

Funding Body Subtype

Universities (academic only)

Location

Canada

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Not expected to be made available