

# World Journal of *Clinical Cases*

*World J Clin Cases* 2021 July 6; 9(19): 4881-5351



# OPINION REVIEW

- 4881** Fear of missing out: A brief overview of origin, theoretical underpinnings and relationship with mental health  
*Gupta M, Sharma A*

# REVIEW

- 4890** Molecular pathways in viral hepatitis-associated liver carcinogenesis: An update  
*Elpek GO*
- 4918** Gastroenterology and liver disease during COVID-19 and in anticipation of post-COVID-19 era: Current practice and future directions  
*Oikonomou KG, Papamichalis P, Zafeiridis T, Xanthoudaki M, Papapostolou E, Valsamaki A, Bouliaris K, Papamichalis M, Karvouniaris M, Vlachostergios PJ, Skoura AL, Komnos A*
- 4939** Enhancing oxygenation of patients with coronavirus disease 2019: Effects on immunity and other health-related conditions  
*Mohamed A, Alawna M*

# MINIREVIEWS

- 4959** Clinical potentials of ginseng polysaccharide for treating gestational diabetes mellitus  
*Zhao XY, Zhang F, Pan W, Yang YF, Jiang XY*
- 4969** Remarkable gastrointestinal and liver manifestations of COVID-19: A clinical and radiologic overview  
*Fang LG, Zhou Q*
- 4980** Liver injury in COVID-19: Known and unknown  
*Zhou F, Xia J, Yuan HX, Sun Y, Zhang Y*
- 4990** COVID-19 and gastroenteric manifestations  
*Chen ZR, Liu J, Liao ZG, Zhou J, Peng HW, Gong F, Hu JF, Zhou Y*
- 4998** Role of epithelial-mesenchymal transition in chemoresistance in pancreatic ductal adenocarcinoma  
*Hu X, Chen W*
- 5007** Insights into the virologic and immunologic features of SARS-COV-2  
*Polat C, Ergunay K*

**ORIGINAL ARTICLE****Basic Study**

- 5019** SMAC exhibits anti-tumor effects in ECA109 cells by regulating expression of inhibitor of apoptosis protein family

*Jiang N, Zhang WQ, Dong H, Hao YT, Zhang LM, Shan L, Yang XD, Peng CL*

**Case Control Study**

- 5028** Efficacy of Solitaire AB stent-release angioplasty in acute middle cerebral artery atherosclerosis obliterative cerebral infarction

*Wang XF, Wang M, Li G, Xu XY, Shen W, Liu J, Xiao SS, Zhou JH*

**Retrospective Study**

- 5037** Diagnostic value of different color ultrasound diagnostic method in endometrial lesions

*Lin XL, Zhang DS, Ju ZY, Li XM, Zhang YZ*

- 5046** Clinical and pathological features and risk factors for primary breast cancer patients

*Lei YY, Bai S, Chen QQ, Luo XJ, Li DM*

- 5054** Outcomes of high-grade aneurysmal subarachnoid hemorrhage patients treated with coiling and ventricular intracranial pressure monitoring

*Wen LL, Zhou XM, Lv SY, Shao J, Wang HD, Zhang X*

- 5064** Microwave ablation combined with hepatectomy for treatment of neuroendocrine tumor liver metastases

*Zhang JZ, Li S, Zhu WH, Zhang DF*

- 5073** Clinical application of individualized total arterial coronary artery bypass grafting in coronary artery surgery

*Chen WG, Wang BC, Jiang YR, Wang YY, Lou Y*

**Observational Study**

- 5082** Early diagnosis, treatment, and outcomes of five patients with acute thallium poisoning

*Wang TT, Wen B, Yu XN, Ji ZG, Sun YY, Li Y, Zhu SL, Cao YL, Wang M, Jian XD, Wang T*

- 5092** Sarcopenia in geriatric patients from the plateau region of Qinghai-Tibet: A cross-sectional study

*Pan SQ, Li YM, Li XF, Xiong R*

- 5102** Medium-term efficacy of arthroscopic debridement *vs* conservative treatment for knee osteoarthritis of Kellgren-Lawrence grades I-III

*Lv B, Huang K, Chen J, Wu ZY, Wang H*

**Prospective Study**

- 5112** Impact of continuous positive airway pressure therapy for nonalcoholic fatty liver disease in patients with obstructive sleep apnea

*Hirono H, Watanabe K, Hasegawa K, Kohno M, Terai S, Ohkoshi S*

**Randomized Controlled Trial**

- 5126** Erector spinae plane block at lower thoracic level for analgesia in lumbar spine surgery: A randomized controlled trial  
*Zhang JJ, Zhang TJ, Qu ZY, Qiu Y, Hua Z*

**SYSTEMATIC REVIEWS**

- 5135** Controversies' clarification regarding ribavirin efficacy in measles and coronaviruses: Comprehensive therapeutic approach strictly tailored to COVID-19 disease stages  
*Liatsos GD*
- 5179** Systematic review and meta-analysis of trans-jugular intrahepatic portosystemic shunt for cirrhotic patients with portal vein thrombosis  
*Zhang JB, Chen J, Zhou J, Wang XM, Chen S, Chu JG, Liu P, Ye ZD*

**CASE REPORT**

- 5191** Myelodysplastic syndrome transformed into B-lineage acute lymphoblastic leukemia: A case report  
*Zhu YJ, Ma XY, Hao YL, Guan Y*
- 5197** Imaging presentation and postoperative recurrence of peliosis hepatis: A case report  
*Ren SX, Li PP, Shi HP, Chen JH, Deng ZP, Zhang XE*
- 5203** Delayed retroperitoneal hemorrhage during extracorporeal membrane oxygenation in COVID-19 patients: A case report and literature review  
*Zhang JC, Li T*
- 5211** Autologous tenon capsule packing to treat posterior exit wound of penetrating injury: A case report  
*Yi QY, Wang SS, Gui Q, Chen LS, Li WD*
- 5217** Treatment of leiomyomatosis peritonealis disseminata with goserelin acetate: A case report and review of the literature  
*Yang JW, Hua Y, Xu H, He L, Huo HZ, Zhu CF*
- 5226** Homozygous deletion, c. 1114-1116del, in exon 8 of the *CRPPA* gene causes congenital muscular dystrophy in Chinese family: A case report  
*Yang M, Xing RX*
- 5232** Successful diagnosis and treatment of jejunal diverticular haemorrhage by full-thickness enterotomy: A case report  
*Ma HC, Xiao H, Qu H, Wang ZJ*
- 5238** Liver metastasis as the initial clinical manifestation of sublingual gland adenoid cystic carcinoma: A case report  
*Li XH, Zhang YT, Feng H*
- 5245** Severe hyperbilirubinemia in a neonate with hereditary spherocytosis due to a *de novo* ankyrin mutation: A case report  
*Wang JF, Ma L, Gong XH, Cai C, Sun JJ*

- 5252** Long-term outcome of indwelling colon observed seven years after radical resection for rectosigmoid cancer: A case report  
*Zhuang ZX, Wei MT, Yang XY, Zhang Y, Zhuang W, Wang ZQ*
- 5259** Diffuse xanthoma in early esophageal cancer: A case report  
*Yang XY, Fu KI, Chen YP, Chen ZW, Ding J*
- 5266** COVID-19 or treatment associated immunosuppression may trigger hepatitis B virus reactivation: A case report  
*Wu YF, Yu WJ, Jiang YH, Chen Y, Zhang B, Zhen RB, Zhang JT, Wang YP, Li Q, Xu F, Shi YJ, Li XP*
- 5270** Maintenance treatment with infliximab for ulcerative ileitis after intestinal transplantation: A case report  
*Fujimura T, Yamada Y, Umeyama T, Kudo Y, Kanamori H, Mori T, Shimizu T, Kato M, Kawaida M, Hosoe N, Hasegawa Y, Matsubara K, Shimojima N, Shinoda M, Obara H, Naganuma M, Kitagawa Y, Hoshino K, Kuroda T*
- 5280** Infliximab treatment of glycogenosis Ib with Crohn's-like enterocolitis: A case report  
*Gong YZ, Zhong XM, Zou JZ*
- 5287** Hemichorea due to ipsilateral thalamic infarction: A case report  
*Li ZS, Fang JJ, Xiang XH, Zhao GH*
- 5294** Intestinal gangrene secondary to congenital transmesenteric hernia in a child misdiagnosed with gastrointestinal bleeding: A case report  
*Zheng XX, Wang KP, Xiang CM, Jin C, Zhu PF, Jiang T, Li SH, Lin YZ*
- 5302** Collagen VI-related myopathy with scoliosis alone: A case report and literature review  
*Li JY, Liu SZ, Zheng DF, Zhang YS, Yu M*
- 5313** Neuromuscular electrical stimulation for a dysphagic stroke patient with cardiac pacemaker using magnet mode change: A case report  
*Kim M, Park JK, Lee JY, Kim MJ*
- 5319** Four-year-old anti-N-methyl-D-aspartate receptor encephalitis patient with ovarian teratoma: A case report  
*Xue CY, Dong H, Yang HX, Jiang YW, Yin L*
- 5325** Glutamic acid decarboxylase 65-positive autoimmune encephalitis presenting with gelastic seizure, responsive to steroid: A case report  
*Yang CY, Tsai ST*
- 5332** Ectopic opening of the common bile duct into the duodenal bulb with recurrent choledocholithiasis: A case report  
*Xu H, Li X, Zhu KX, Zhou WC*
- 5339** Small bowel obstruction caused by secondary jejunal tumor from renal cell carcinoma: A case report  
*Bai GC, Mi Y, Song Y, Hao JR, He ZS, Jin J*
- 5345** Brugada syndrome associated with out-of-hospital cardiac arrest: A case report  
*Ni GH, Jiang H, Men L, Wei YY, A D, Ma X*

**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Fan-Bo Meng, MD, PhD, Chief Doctor, Deputy Director, Professor, Department of Cardiology, China-Japan Union Hospital of Jilin University, Changchun 130000, Jilin Province, China. mengfb@jlu.edu.cn

**AIMS AND SCOPE**

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

**INDEXING/ABSTRACTING**

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2020 Edition of Journal Citation Reports® cites the 2019 impact factor (IF) for WJCC as 1.013; IF without journal self cites: 0.991; Ranking: 120 among 165 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2019 is 0.3 and Scopus CiteScore rank 2019: General Medicine is 394/529.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Yan-Xia Xing, Production Department Director: Yun-Xiaoqian Wu, Editorial Office Director: Jin-Li Wang.

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Thrice Monthly

**EDITORS-IN-CHIEF**

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

**PUBLICATION DATE**

July 6, 2021

**COPYRIGHT**

© 2021 Baishideng Publishing Group Inc

**INSTRUCTIONS TO AUTHORS**

<https://www.wjgnet.com/bpg/gerinfo/204>

**GUIDELINES FOR ETHICS DOCUMENTS**

<https://www.wjgnet.com/bpg/gerinfo/287>

**GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH**

<https://www.wjgnet.com/bpg/gerinfo/240>

**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/gerinfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/gerinfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>



# Homozygous deletion, c. 1114-1116del, in exon 8 of the *CRPPA* gene causes congenital muscular dystrophy in Chinese family: A case report

Mi Yang, Ru-Xin Xing

**ORCID number:** Mi Yang [0000-0003-3920-8979](https://orcid.org/0000-0003-3920-8979); Ru-Xin Xing [0000-0002-2559-4840](https://orcid.org/0000-0002-2559-4840).

**Author contributions:** Yang M collected the clinical data and drafted the manuscript; Xing RX revised the manuscript for intellectual content; All authors read and approved the final manuscript.

**Supported by** the Medical and Health Science and Technology Program of Zhejiang Province, No. 2018273034.

**Informed consent statement:** Written informed consent was obtained from each participant for publication of this case report.

**Conflict-of-interest statement:** The authors declare that they have no competing interests.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in

**Mi Yang**, Department of Neurology, The Fourth Affiliated Hospital, Zhejiang University School of Medicine, Yiwu 322000, Zhejiang Province, China

**Ru-Xin Xing**, Department of Neurosurgery, The Fourth Affiliated Hospital, Zhejiang University School of Medicine, Yiwu 322000, Zhejiang Province, China

**Corresponding author:** Mi Yang, MD, PhD, Doctor, Department of Neurology, The Fourth Affiliated Hospital, Zhejiang University School of Medicine, No. 1 Shangcheng Avenue, Yiwu 322000, Zhejiang Province, China. [mier999@zju.edu.cn](mailto:mier999@zju.edu.cn)

## Abstract

### BACKGROUND

Congenital muscular dystrophy (CMD) is a clinically and genetically heterogeneous group of inherited muscle disorders. Mutations in the *CRPPA* gene (encoding CDPLribitol pyrophosphorylase A) are recognized as causative factors of dystroglycanopathies, a subtype of CMD with defects in glycosylation.

### CASE SUMMARY

The present study examined a Chinese family, whose proband presented mainly with muscle weakness in both lower limbs but without brain and eye symptoms. In this family, a homozygous deletion, c. 1114-1116del (p.V372del), was identified in exon 8 of *CRPPA* in the proband, while a heterozygous deletion was identified in the proband's father and mother, who lacked symptoms. A mild dystroglycanopathy of CMD was diagnosed.

### CONCLUSION

The findings of this study expanded the clinical and mutational spectrum of patients with CMD associated with *CRPPA* mutations.

**Key Words:** Congenital muscular dystrophy; *CRPPA*; Mutation; Dystroglycanopathy; Case report

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.



accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

**Manuscript source:** Unsolicited manuscript

**Specialty type:** Clinical neurology

**Country/Territory of origin:** China

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0  
Grade B (Very good): B  
Grade C (Good): C  
Grade D (Fair): 0  
Grade E (Poor): 0

**Received:** February 9, 2021

**Peer-review started:** February 9, 2021

**First decision:** February 28, 2021

**Revised:** March 8, 2021

**Accepted:** April 12, 2021

**Article in press:** April 12, 2021

**Published online:** July 6, 2021

**P-Reviewer:** Chisthi MM

**S-Editor:** Zhang L

**L-Editor:** Filipodia

**P-Editor:** Wang LL



**Core Tip:** A homozygous deletion, c. 1114-1116del (p.V372del), was identified in the exon 8 of the *CRPPA* gene in a Chinese family, which was diagnosed as congenital muscular dystrophy. Mutations in the *CRPPA* gene are recognized as causative factors of dystroglycanopathies, a subtype of congenital muscular dystrophy with defects in glycosylation. Findings in this study expanded the clinical and mutational spectrum of congenital muscular dystrophy patients with the *CRPPA* gene.

**Citation:** Yang M, Xing RX. Homozygous deletion, c. 1114-1116del, in exon 8 of the *CRPPA* gene causes congenital muscular dystrophy in Chinese family: A case report. *World J Clin Cases* 2021; 9(19): 5226-5231

**URL:** <https://www.wjgnet.com/2307-8960/full/v9/i19/5226.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v9.i19.5226>

## INTRODUCTION

Congenital muscular dystrophy (CMD) is a clinically and genetically heterogeneous group of inherited muscle disorders, with muscle weakness often apparent at birth or in infancy. CMD is subtyped mainly by the causative pathogenic variants of multiple genes[1]. Currently, there are no complete or satisfactory classification systems. Classification by phenotype has shortcomings because the same phenotype can be caused by pathogenic variants in different genes, while one gene can result in a spectrum of clinical phenotypes. CMD is often subtyped according to the gene and its encoded protein in which the pathogenic variants occur, for example, defects in structural proteins (Laminin alpha-2 deficiency; collagen VI-deficient CMD), defects in glycosylation (dystroglycanopathies), defects of endoplasmic reticulum proteins (*SEPN1*-related CMD), and defects of nuclear envelope proteins (*LMNA*-related CMD)[2,3]. More than 19 gene mutations in *POMT1*, *LARGE1*, *POMT2*, *FKRP*, *POMGNT1*, *FKTN*, and Isoprenoid synthase domain-containing (*ISPD*, also called *CRPPA*) genes have been identified in dystroglycanopathies[4,5].

The *CRPPA* gene encodes CDP-L-ribitol pyrophosphorylase A, a protein involved in glycosylation. *CRPPA* helps to produce ribitol 5-phosphate, which is an important component of  $\alpha$ -dystroglycan. The  $\alpha$ -dystroglycan protein helps to anchor the cytoskeleton to the lattice of proteins and other molecules in the extracellular matrix. In skeletal muscles, glycosylated  $\alpha$ -dystroglycan helps to stabilize and protect muscle fibers[6]. *CRPPA* mutations can cause deficiency of functional  $\alpha$ -dystroglycan and damaged muscle fibers, which affects the development, structure, and function of skeletal muscles[7]. Besides causing dystroglycanopathies, *CRPPA* mutations have been identified in Walker-Warburg syndrome, muscle-eye-brain disease, and limb-girdle muscular dystrophy[5,8].

Most of the reported CMDs are inherited in an autosomal recessive manner and often affect one individual in non-consanguineous, small families. In contrast, most individuals with *LMNA*-related CMD and collagen VI-deficient CMD have a de novo pathogenic variant following an autosomal dominant manner. In the present study, we examined a family with CMD inherited in an autosomal recessive manner and identified a deletion, c. 1114-1116del, in the *CRPPA* gene as the cause.

## CASE PRESENTATION

### Chief complaints

A 26-year-old male presented with a 20-year history of elevated creatine kinase levels, and he had been diagnosed with fatigue in both lower limbs 4 years ago.

### History of present illness

The patient visited the local hospital due to poor performance in his physical education class and was found to have an increase in creatine kinase levels (12270 U/L) 20 years ago when he was 6-years-old). At that time, there were no obvious symptoms of physical weakness in ordinary life, only the poor performance in physical education. No deletion of the *DMD* gene (encoding dystrophin) was detected



using 25 pairs of primers. The patient accepted treatment with Chinese herbal medicine; however, the level of creatine kinase did not decrease significantly. Four years ago (at 22-years-old), the patient began to experience weakness in both lower extremities, manifested as strenuous standing up from a squatting position and strenuous stepping up the stairs, which gradually worsened to the point that standing up from squatting required hand support on the knees.

### **History of past illness**

The patient was healthy before.

### **Personal and family history**

The patient denied consanguineous marriage and any special medical history and personal history. The parents had no symptoms of muscle weakness and had a normal creatine kinase level.

### **Physical examination**

Physical examinations showed a 4/5 muscle strength when lying down while holding the head up; 5/5 muscle strength for the double upper extremity deltoid muscles, triceps, flexor and extensor carpal muscles, and short flexor extensor; 4/5 muscle strength for the biceps; 3/5 muscle strength for the double lower limb iliac muscles, gluteus maximus, and quadriceps; 1/5 muscle strength for the thigh adductor; 4/5 muscle strength for the gluteal middle muscle and hamstring muscle; and 5/5 muscle strength for tibialis anterior muscle and gastrocnemius muscle. The muscle tone was normal, and the upper tendon reflex and ankle reflex were normal. However, there was no reflex of both knees. Bilateral Babinski sign was negative.

### **Laboratory examinations**

Enzyme tests showed creatine kinase of 11082 U/L and creatine kinase myocardial band of 126 U/L.

### **Imaging examinations**

A routine electrocardiogram showed sinus arrhythmia and left ventricular high voltage. Pulmonary function test showed nonspecific ventilation dysfunction. Chest computed tomography showed left interlobar pleura and local pleura nodular thickening, suggesting an inflammation. Heart Doppler ultrasound and liver, gallbladder, pancreas, spleen, and urinary tract ultrasound showed no obvious abnormalities. Neuromyography showed no obvious abnormalities in motor nerve and sensory nerve conduction velocity. Quantitative electromyography measurement showed some myogenic changes in the right medial femoral muscle, gastrocnemius muscle, and tibialis anterior muscle. Magnetic resonance imaging of the right calf showed that the gastrocnemius muscle and soleus muscle were experiencing atrophy to different degrees, mainly in the medial head of the gastrocnemius muscle (Figure 1).

### **Mutation analysis**

The proband and his parents were enrolled after providing informed written consent. Genomic DNA was extracted from white blood cells using a Genomic DNA extraction kit (Qiagen, Hilden, Germany). All exons of the *CRPPA* gene were sequenced using whole exome sequencing (Yulong Biomedical Group, Shanghai, China).

A homozygous deletion, c. 1114-1116del (p.V372del), was identified in exon 8 of the *CRPPA* gene (NM\_001101426.3) in the proband (Figure 2B), while a heterozygous deletion was identified in the proband's father and mother (Figure 2C and 2D). This variant was not included in the 1000 Genomes Project database or the ESP6500 data set of the National Heart, Lung, and Blood Institute exome sequencing project.

---

## **FINAL DIAGNOSIS**

---

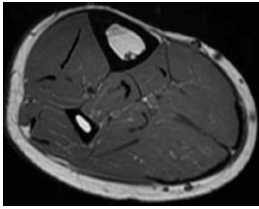
A mild dystroglycanopathy of CMD was diagnosed.

---

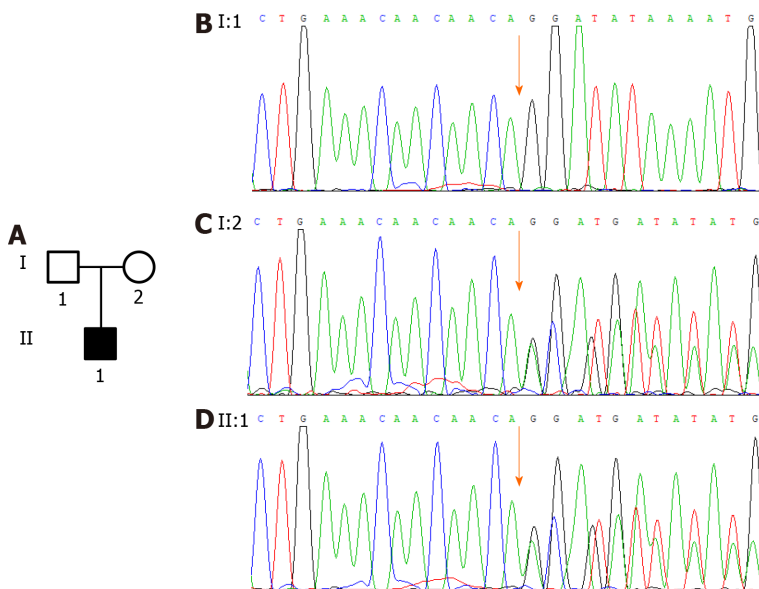
## **TREATMENT**

---

The patient was treated with vitamin B2 (5 mg three times a day) and coenzyme Q10 (10 mg three times a day).



**Figure 1** Magnetic resonance imaging of the right calf. The gastrocnemius muscle and soleus muscle showed mild atrophy, mainly in the medial head of the gastrocnemius muscle.



**Figure 2** Congenital muscular dystrophy family. A: A pedigree with the *CRPPA* variant; B: The variant identified in the proband's father; C: The variant identified in the proband's mother; D: The variant identified in the proband. Arrows mean the site of the variant.

## OUTCOME AND FOLLOW-UP

During a follow-up period of 3 mo, the symptoms remained the same.

## DISCUSSION

The pedigree presented in this study suggested a recessively inherited muscle disorder with progressive muscle weakness. Although there were no obvious symptoms of physical weakness in ordinary life in the proband at 6-years-old, his creatine kinase level was elevated and his performance in physical education was poor. This suggested mild muscle damage. Thus, the proband was diagnosed with congenital muscular dystrophy.

Muscular dystrophy is a disorder often caused by mutations in genes involved in muscle structure and function, which leads to muscle weakness and progressive disability[9]. Patients with muscular dystrophy often have an elevated level of creatine kinase caused by muscle damage[10]. Mostly, muscular dystrophy runs in families and can be a recessive, dominant, or X-linked inherited disorder[9]. In this study, gene mutation detection found a homozygous mutation, c. 1114-1116del, in *CRPPA* in the proband; however, his mother and father have a heterozygous deletion. The heterozygous mutation did not cause obvious muscle weakness in the patient's parents, suggesting that only the homozygous mutation is pathogenic. We therefore propose that CMD caused by mutation of c. 1114-1116del of the *CRPPA* gene operates in a recessively inherited manner in this family.

Dystroglycanopathies are a group of CMDs caused by defects in glycosylation and are extremely variable in phenotypic severity. Severe dystroglycanopathies can result in structural brain, eye, and muscle abnormalities, while less severe forms of the disease group often have an adult onset without brain or eye abnormalities[11]. In this

study, the symptoms of physical weakness occurred in the proband at 22-years-old, and no brain or eye abnormalities were found. This suggested mild dystroglycanopathy. Thus, CMD with c. 1114-1116del in the *CRPPA* gene progressed slowly. The proband was diagnosed with a mild dystroglycanopathy of CMD.

To date, mutations in 18 genes, including those encoding proteins involved in  $\alpha$ -dystroglycan glycosylation (*FKTN*, *FKRP*, *ISPD*, and *TMEM5*) have been identified in patients with the dystroglycanopathy subtype of CMD, and all these mutations demonstrate autosomal recessive inheritance[12]. The *CRPPA* gene has over ten other names, including *ISPD*[5]. *ISPD* mutations were identified in several dystroglycanopathy variants including CMD, Walker-Warburg syndrome, limb-girdle muscular dystrophy, and cobblestone lissencephaly[13]. In our pedigree, no mutation of the *DMD* gene was detected. *DMD* is the largest known human gene that is involved in the production of dystrophin, which functions in muscle movement. In contrast, the *CRPPA* gene produces a protein that regulates  $\alpha$ -dystroglycan in glycosylation, which subsequently stabilizes and protects muscle fibers.

## CONCLUSION

In conclusion, this study reported a pedigree in which the proband had mild dystroglycanopathy of CMD caused by a homozygous mutation, c. 1114-1116del, of the *CRPPA* gene.

## ACKNOWLEDGEMENTS

We are thankful to the patient who agreed to participate in this study.

## REFERENCES

- 1 **Wang CH**, Bonnemann CG, Rutkowski A, Sejersen T, Bellini J, Battista V, Florence JM, Schara U, Schuler PM, Wahbi K, Aloysius A, Bash RO, Bérout C, Bertini E, Bushby K, Cohn RD, Connolly AM, Deconinck N, Desguerre I, Eagle M, Estournet-Mathiaud B, Ferreira A, Fujak A, Goemans N, Iannaccone ST, Jouinot P, Main M, Melacini P, Mueller-Felber W, Muntoni F, Nelson LL, Rahbek J, Quijano-Roy S, Sewry C, Storhaug K, Simonds A, Tseng B, Vajsar J, Vianello A, Zeller R; International Standard of Care Committee for Congenital Muscular Dystrophy. Consensus statement on standard of care for congenital muscular dystrophies. *J Child Neurol* 2010; **25**: 1559-1581 [PMID: 21078917 DOI: 10.1177/0883073810381924]
- 2 **Fichna JP**, Macias A, Piechota M, Korostyński M, Potulska-Chromik A, Redowicz MJ, Zekanowski C. Whole-exome sequencing identifies novel pathogenic mutations and putative phenotype-influencing variants in Polish limb-girdle muscular dystrophy patients. *Hum Genomics* 2018; **12**: 34 [PMID: 29970176 DOI: 10.1186/s40246-018-0167-1]
- 3 **Sparks SE**, Quijano-Roy S, Harper A, Rutkowski A, Gordon E, Hoffman EP, Pegoraro E, Adam MP, Ardinger HH, Pagon RA, Wallace SE, Bean LJH, Mirzaa G, Amemiya A. Congenital Muscular Dystrophy Overview – RETIRED CHAPTER, FOR HISTORICAL REFERENCE ONLY 1993 [PMID: 20301468]
- 4 **Saito K**, Adam MP, Ardinger HH, Pagon RA, Wallace SE, Bean LJH, Mirzaa G, Amemiya A. Fukuyama Congenital Muscular Dystrophy 1993 [PMID: 20301385]
- 5 **Gençpınar P**, Uyanık G, Haspolat Ş, Oygür N, Duman Ö. Clinical and Molecular Manifestations of Congenital Muscular Alpha-Dystroglycanopathy due to an ISPD Gene Mutation. *Neurophysiology* 2019; **51**: 373-378 [DOI: 10.1007/s11062-020-09831-y]
- 6 **United States National Library of Medicine**. CRPPA gene. CDP-L-ribitol pyrophosphorylase A. In: MedlinePlus [cited 3 March 2021]. Available from: <https://ghr.nlm.nih.gov/gene/CRPPA>
- 7 **Barton ER**, Pacak CA, Stoppel WL, Kang PB. The ties that bind: functional clusters in limb-girdle muscular dystrophy. *Skelet Muscle* 2020; **10**: 22 [PMID: 32727611 DOI: 10.1186/s13395-020-00240-7]
- 8 **Song D**, Fu X, Ge L, Chang X, Wei C, Liu J, Yang H, Qu S, Bao X, Toda T, Wu X, Xiong H. A splice site mutation c.1251G>A of ISPD gene is a common cause of congenital muscular dystrophy in Chinese patients. *Clin Genet* 2020; **97**: 789-790 [PMID: 31909476 DOI: 10.1111/cge.13695]
- 9 **National Health Service**. Muscular dystrophy-Causes. [cited 3 March 2021]. Available from: <https://www.nhs.uk/conditions/muscular-dystrophy/causes/>
- 10 **Mayo Clinic**. Muscular dystrophy-Diagnosis. [cited 3 March 2021]. Available from: <https://www.mayoclinic.org/diseases-conditions/muscular-dystrophy/diagnosis-treatment/diagnosis/dxc-20375389>

- 11 **Johnson K**, Bertoli M, Phillips L, Töpf A, Van den Bergh P, Vissing J, Witting N, Nafissi S, Jamal-Omidi S, Łusakowska A, Kostera-Pruszyk A, Potulska-Chromik A, Deconinck N, Wallgren-Pettersson C, Strang-Karlsson S, Colomer J, Claeys KG, De Ridder W, Baets J, von der Hagen M, Fernández-Torrón R, Zulaica Ijurco M, Espinal Valencia JB, Hahn A, Durmus H, Willis T, Xu L, Valkanas E, Mullen TE, Lek M, MacArthur DG, Straub V. Detection of variants in dystroglycanopathy-associated genes through the application of targeted whole-exome sequencing analysis to a large cohort of patients with unexplained limb-girdle muscle weakness. *Skelet Muscle* 2018; **8**: 23 [PMID: [30060766](#) DOI: [10.1186/s13395-018-0170-1](#)]
- 12 **Bouchet-Séraphin C**, Vuillaumier-Barrot S, Seta N. Dystroglycanopathies: About Numerous Genes Involved in Glycosylation of One Single Glycoprotein. *J Neuromuscul Dis* 2015; **2**: 27-38 [PMID: [28198708](#)]
- 13 **Magri F**, Colombo I, Del Bo R, Previtali S, Brusa R, Ciscato P, Scarlato M, Ronchi D, D'Angelo MG, Corti S, Moggio M, Bresolin N, Comi GP. ISPD mutations account for a small proportion of Italian Limb Girdle Muscular Dystrophy cases. *BMC Neurol* 2015; **15**: 172 [PMID: [26404900](#) DOI: [10.1186/s12883-015-0428-8](#)]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

**Telephone:** +1-925-3991568

**E-mail:** [bpgoffice@wjgnet.com](mailto:bpgoffice@wjgnet.com)

**Help Desk:** <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

