University of Manitoba Journal of Medicine

UMJM

VOLUME 5 • ISSUE 1
SEPTEMBER 2022

ISSN 2561-9578
9 772561 957000

Table of Contents

Art

Preface

Articles

Short Story

Awards

Outstanding Original Submissions for Volume 5 Issue 1 is awarded to Ms. Maria Baranowski. Congratulations!

Learn more about how to submit your original writing at www.umjm.ca. The *UMJM* can also be found on Twitter @UMJMed We welcome submissions from students, residents, and faculty members from all colleges within the Rady Faculty of Health Sciences. Authors from institutions outside of the Rady Faculty of Health Sciences and the University of Manitoba are also welcome. We look forward to your submission!

2021–2022 UMJM Team

Editors in Chief

Victoria Lee-Wing Nebojša Oravec

Junior Chief Editors

Danielle Judd Luke Sirant

Associate Editors

Ina Siwach Carrie Gu

Senior Submission Editors

Giorgio Karam Dave Xie Sam Krishnan

Junior Submission Editors

Ninglu Weng Joadi Jacobs Anna Tourtchaninova Kate Bernier

Junior Citation Editors

Nikolas Furletti Elizabeth Tingey Jacie Liu

IT & Design Editors

Alex Chin (Chief) Gem Newman (Senior) Nathan Lee-Wing (Junior)

Communications Manager

Amelia Baker (Senior) Harman Vats (Junior)

Faculty Reviewers

Dr. Merril Pauls Dr. Clarence Khoo Dr. Robert Beattie Ms. Angela Krutish
Dr. Margaret Morris Dr. Jeff Saranchuk Dr. Christine Robinson

Letter from the Editors

Dear reader,

We are proud to present the fifth volume of the *University of Manitoba Journal of Medicine (UMJM).*

UMJM is a student-run journal that publishes original submissions from students and trainees from the Rady Faculty of Health Sciences, as well as other authors from the University of Manitoba. Originally founded in 2017, *UMJM* has produced six iterations comprising 43 published works, and has included over 40 members in its editorial teams. The journal receives a large number of high-quality submissions each year, which are adjudicated by a team of student and faculty reviewers. We publish a variety of media, including formal academic articles, short stories, poetry, and artwork.

Volume 5 is no exception to the breadth of work showcased by students at our university. You will find a case report of a gynecologic malignancy and clinical reviews of diagnostic approaches to arrhythmia and prostate cancer. Other articles are inspired by personal experiences of epidemics and disability. Also represented are original artworks inspired by the COVID-19 pandemic.

We would like to sincerely thank the incredible group of students comprising *UMJM*'s editorial team. This publication is only made possible through the diverse talents represented by our members, which are not limited to academic writing, but include graphic design, information and technology, and social media management and communications. This year, our team has expanded to include citation editors, who verify the integrity of submitted works, and for the first time, we welcomed a submission editor from outside the College of Medicine. Our colleagues have demonstrated immense dedication to reviewing and editing submissions, and contributed sophisticated feedback beyond what is expected of a student-run journal. We have no doubt that the members of *UMJM* will go on to make significant contributions to academia and professional writing.

We would also like to thank our faculty reviewers who take time to review every one of our articles and provide us with their invaluable expertise. Their support is a testament to the University's commitment to fostering the next generation of academic clinicians in our province.

On behalf of the *UMJM*, we hope you enjoy Volume 5. Perhaps you will be inspired to submit to our journal in the future.

Sincerely,

Victoria Lee-Wing & Nebojša Oravec
Co-Editors-In-Chief

Ovarian thecoma: a rare cause of endometrial hyperplasia

Georgia Chappell MD[†] Peter Klippenstein MD, FRCPS[†] Vivian Schutt MD, FRCPS[†]

Abstract

Background: In this case, management of endometrial hyperplasia led to the rare finding of an ovarian thecoma. Endometrial hyperplasia results from exposure to unopposed estrogen; rarely, this stems from a hormone-secreting tumour.

Case: A 79-year-old female presented with post-menopausal bleeding. Endometrial biopsy demonstrated simple hyperplasia. A dilation and curettage was performed; pathology showed endometrial polyps with foci of complex hyperplasia without atypia. A trial of Medroxyprogesterone Acetate was not successful, with continued bleeding. A repeat biopsy showed ongoing hyperplasia. At laparoscopic hysterectomy and salpingo-oophorectomy, an ovarian mass was found. Final surgical pathology found an ovarian thecoma.

Conclusion: This case illustrates the importance of considering rare causes of endometrial hyperplasia, such as a hormone-secreting tumour, particularly in the late post-menopausal patient.

Keywords: gynecology, ovarian masses, minimally invasive surgery

Conflict of Interest Statement: There are no funding sources or competing interests to declare.

Background

We present a case in which the common diagnosis of endometrial hyperplasia led to the rare finding of an ovarian thecoma. Endometrial hyperplasia is a relatively common presentation in the perimenopause, with an overall incidence of 133/100 000 women between the ages of 18–90.[1] Peak incidence is between the ages of 50–54.[1] Common risk factors include age, menopausal status, nulliparity, history of infertility, anovulation, and obesity, reflecting a history of unopposed estrogen.[1] In the late menopause, sources of unopposed estrogen are either iatrogenic or endogenous via aromatization through peripheral fat stores or, as this case demonstrates, a hormone secreting tumour.[2]

Thecomas are benign stromal ovarian tumors.[3] A rare tumor, they account for 1% of all benign ovarian neoplasms.[4] Generally, these tumors are unilateral. They most often develop in post-menopausal women in their sixth decade.[5] Thecomas are hormone-secreting tumors that may secrete estrogens, androgens, or a combination of both. Primary signs and symptoms include abnormal uterine bleeding, evidence of a pelvic mass, or both.[5] Upon investigation, endometrial hyperplasia or adenocarcinoma may be found as a result of estrogen-secreting thecomas. The diagnosis of an ovarian thecoma is a histologic diagnosis based on a tissue sample from surgical resection. Pre-operatively, the diagnosis may be suspected based on an ovarian mass found on imaging paired with features of hyperestrogenism or hyper-androgenism. Ovarian thecomas are benign, and surgical resection is curative.[5]

Case

A 79-year-old woman presented with post-menopausal bleeding 27 years after her last normal menses. Relevant medical history included primiparity, hypertension, hypercholesterolemia, atrial fibrillation, stroke, Parkinson's disease, hypertension, gastroesophageal reflux disease (GERD), and gout. Her BMI was in the normal range. On review of systems, she suffered from persistent nausea and vomiting. The patient's medications included warfarin, colchicine, diltiazem, domperidone, esomeprazole, Levodopa, Ramipril, rosuvastatin, and Tylenol #3.

As part of the initial workup, she had two ultrasounds three months apart. The findings were consistent between both scans, showing a thickened endometrium of 20 mm with both vascular and cystic changes and a possible endometrial polyp. The ovaries were described as normal on both occasions. An endometrial pipelle biopsy was then done, which showed simple hyperplasia. Given these results, she was referred for hysteroscopy with dilatation and curettage. During this procedure, multiple polyps were removed by curetting. Post-procedure pathology demonstrated

*Correspondence to: chappelg@myumanitoba.ca
[†]Department of Obstetrics and Gynecology, Max Rady College of Medicine, University of Manitoba

endometrial polyps with foci of complex hyperplasia without atypia.

The patient was counselled regarding treatment given the foci of complex hyperplasia with multiple polyps and ongoing post-menopausal bleeding. She ultimately chose a trial of Medroxyprogesterone Acetate (MPA) for 3 to 6 months with a follow up endometrial biopsy after the initial course of medication. She continued to experience bleeding and stopped the MPA. A repeat biopsy was performed and showed endometrial hyperplasia with morular changes mimicking atypia. Total laparoscopic hysterectomy with bilateral salpingo-oophorectomy and washings was therefore arranged approximately six months after her original ultrasound.

The surgery was performed with no complications. Intraoperative findings included a right ovarian cyst, yellow and irregular in appearance. Final pathology showed endometrial complex atypical hyperplasia with right ovarian thecoma. The patient's postoperative course was unremarkable. Her nausea and vomiting resolved immediately following surgery, and she was discharged on post-operative day 1.

Conclusion

Given the presence of an estrogen-secreting tumour, conservative medical management was not effective in this case and surgical intervention was ultimately required. This case illustrates the importance of considering rare causes of endometrial hyperplasia, such as a hormone-secreting tumour, particularly in the late post-menopausal patient with no other risk factors for hyperplasia such as obesity or a history of chronic anovulation. An interesting point about this case is the normal appearance of the patient's ovaries on imaging; this meant that coming to the eventual diagnosis of a hormone-secreting tumour without surgical intervention would have been extremely difficult. Overall, this case is an excellent example of the natural history of the ovarian thecoma and its association with endometrial hyperplasia.

Key points

1. In general, endometrial hyperplasia is caused by exposure to unopposed estrogen.
2. Endometrial hyperplasia may not respond to conservative management.
3. Consider rare causes of endometrial hyperplasia, such as a hormone-secreting tumour, particularly in the late post-menopausal patient.

References

[1] Auclair M, Yong P, et al. Guideline No. 390: Classification and management of endometrial hyperplasia. Joint GOG–SOGC Clinical Practice Guideline. 2019;41(12):1789–1800.

[2] Moore E, Shafi M. Endometrial hyperplasia. Obstetrics, Gynaecology and Reproductive Medicine. 2013;23(3):88–93.

[3] Podfigurna-Stopa A, et al. Recurrent endometrial hyperplasia as a presentation of estrogen-secreting thecoma – case report and minireview of the literature. Gynecological Endocrinology. 2015;32(3):184–187.

[4] Raynaud M, Plante M, Roy M. Ovarian thecoma associated with a large quantity of ascites and elevated serum CA 125 and CA 15-3. Journal of Obstetrics and Gynecology Canada. 2002;24(12):963–965.

[5] Hoffman B, et al. Williams Gynecology. 4th ed. New York: McGraw-Hill; 2020.

A closer look at disability: a parent's commentary

Maria Baranowski, MSc, RD[†]

Abstract

Disability has long been considered as a reason to grieve. Historically, the lived experience of individuals categorized as having a disability, and their families, has not been meaningfully considered or accurately understood. Individuals characterized with a disability have been institutionalized, educated separately, and isolated from the majority of the population throughout human history. These actions have impacted relationships in all environments. As beliefs and values have evolved over time, the traditional meaning and culture of disability has been challenged and is beginning to change. At the same time, prenatal screening and testing now provides information to potential parents about the likelihood of their child being born with a condition that is characterized as a disability. Some research suggests that increased access to this type of data is associated with a reduction in the prevalence of some conditions characterized as disability within our population. So, while there is advocacy for inclusion and to consider and treat individuals characterized with a disability the same as those without a diagnosis, there also appears to be selective termination of some lives that are predicted to include disability. Now is an opportunity to reconsider our own assumptions about disability, and a plurality of perspectives, especially those perspectives that we perceive to be most different than our own.

Keywords: disability, prenatal screening, pregnancy, social model of disability

Conflict of Interest Statement: The author is a parent of a child postnatally diagnosed with Trisomy 21.

Other Disclosures: This subject matter was referenced and briefly discussed in a term paper submitted in a graduate level course in 2021.

Introduction

Advanced medical technology and greater access to prenatal care have provided potential parents with information about their offspring that was unattainable in previous generations. The following is a commentary about the potential consequences of greater access to this type of information specifically, as it applies to predicting what is characterized as disability. For example, de Graaf and colleagues recently observed an association between increased population reduction rates of Down syndrome and the introduction of prenatal screening in almost all European countries. They reported an estimated 27% population reduction rate of individuals born with Down syndrome living in Europe.[1] The advocacy group, "We Need a Law," suggests that increased access to prenatal testing and genetic counseling is associated with a presumption that parents will select abortion.[2] This opinion has been shared and discussed by others.[3–6]

This presumption may be partly explained by the traditional, yet largely uncritiqued, application of the Kubler-Ross grief model (1969) in the interpretation of a parents' experience having a child born with a disability, even though the model was designed to describe the process of dying and death, not disability.[7] This was not its original intention nor may accurately reflect a parent's lived experience. Many professionals have been taught that parents experience the stages of grief outlined from Kubler-Ross' work on death and dying when they learn of their child's disability.[8] Their lived experience has not been significantly considered or represented and consequently, the traditional understanding and perception of disability may not be accurate. Notably, Kearney and Griffin reported that parents of children born with a disability shared that they experience feelings of joy from their lived experience with their child, but sorrow from their experiences with professionals and others.[9] Other parents have also shared their positive experiences.[3,4]

Disability itself has been historically portrayed as the lack or absence of a desirable quality or ability and characterized as inherently negative or unwanted. These individuals and their families have faced discrimination, institutionalization, segregation, and isolation throughout human history. Societal beliefs and atti-

*Correspondence to: baranowm@myumanitoba.ca
[†]Department of Community Health Sciences, University of Manitoba

tudes towards individuals characterized with disability and their families have changed slowly over time; it was not until 2006 when the UN Convention on the Rights of Persons with Disabilities was adopted, recognizing individuals with disabilities as active members of society.[10]

Thesis statement

The purpose of this commentary is to explore how the provision of information regarding prenatal disability screening and its results may influence the experience and perceived choices of the recipient, particularly in relationships where there is a power imbalance, such as between a healthcare professional and patient. Not only are patients dependent on the accurate interpretation of test results by their healthcare provider, especially when the information may be used to inform decisions that may have significant and long-term consequences, they may also be influenced by the delivery of information about prenatal disability screening and test results. Demonstrations of compassion and sensitivity, as well as consideration to parents' lived experience, are important values to guide healthcare providers' behaviours towards parents during this time.

Arguments

In more recent times, advanced prenatal screening has provided parents with access to additional information about the probability of having a child born with certain disabilities. There may be a multitude of factors parents consider when deciding how to manage a pregnancy, and prenatal disability screening results may represent one of many factors for some parents. Due to its potentially significant influence on parents' perceived choices, the importance of the way in which an individual receives prenatal screening test results has been explored. In their systematic review of qualitative studies that explored parental responses to a prenatal diagnosis, Lou and colleagues reported that empathetic and informative interactions with clinicians were a key component of a parent's experience in an unexpected and vulnerable moment. For example, prospective parents requested clear, specific, detailed, and written information to reflect upon at a later time.[11] From their review, Lou et al. also found that parents noted when their feelings were acknowledged, and each word, gesture, and expression of support from professionals.[11] Nelson Goff and colleagues found no difference between groups in their comparative study of parent's experiences receiving the initial Down syndrome diagnosis pre- or postnatally, and reported that parents in both groups shared that they received a lack of current and accurate information, and little or no compassion or support, from medical professionals.[12] From their interviews with prospective parents, Ashtiani and colleagues propose a mechanism that may determine whether parents perceive their experience of receiving a medical genetic diagnosis as positive or negative. A few examples from their findings suggest that a positive experience was reported when parents felt prepared to receive the information, hope was conveyed by the medical professionals, and less jargon was used during the appointment.[13] Demonstrating empathy towards prospective parents who may be unprepared to receive life-changing information, speaking clearly and simply about the facts of the diagnosis, including things that are not known, providing a safe space for parents to express their reaction, and planning for future follow-ups, may be helpful strategies to create a more positive experience.

Hulda Hjartardottir, head of the Prenatal Diagnosis Unit at Landspitali University Hospital in Iceland, a country where it has been reported that only 2 or 3 children are born with Down syndrome per year, shares that "We try to do as neutral counseling as possible, but some people would say that just offering the test is pointing you towards a certain direction."[14] It may also be important to understand and convey that disability is not synonymous with disease or poor health, and that the former does not necessarily infer the latter.[15] For example, the Canadian Down Syndrome Society lists some health concerns associated with Down syndrome on their website while also highlighting that these health problems can occur in individuals without Down syndrome and can be successfully managed and treated.[16] While it is important for parents to be informed of their child's potentially increased risk for some medical conditions from healthcare professionals, it is also important to acknowledge their inherent position of power in translating scientific evidence, and to frame these facts within a greater context to ensure that parents are interpreting the information accurately and are not left feeling disempowered.

Conclusion

The absence of diagnosis of disability at birth does not preclude one from experiencing disability throughout their own life, or in that of a loved one. In fact, based on 2010 world population estimates and 2004 disability prevalence estimates, the World Health Organization reports over a billion people (approximately 15% of the world's population) are living with a disability.[17]

It is possible to marvel at the advancements in medical technology while also acknowledging its potential for error and limitation. Recognition of the inherent power imbalance between healthcare professionals and their patients is essential, especially when experiencing an unexpected event. There is great responsibility on those in positions of influence to deliver information in a balanced and sensitive manner.

In light of the reduced population prevalence rate of Down syndrome reported by de Graaf and colleagues, we may choose to re-examine our societal beliefs about how we perceive those characterized with disability.[1] From the perspective of the social model of disability, it may be the environment and not the individual, in need of improvement.[18] Future research on the impact

of decreased prevalence of live births of those born with disability associated with increased prenatal screening may be warranted. What is the impact on parents who decide to continue their pregnancy, and on those who decide to terminate their pregnancy? What is the impact on individuals currently living with disability? What is the impact on social norms, advocacy efforts, and social inclusion?

The way in which we perceive one another, especially those we believe are most different than ourselves, may not always be based on accurate information or lived experience. Consideration of a plurality of perspectives through examination of scientific evidence and exploration of lived experience may challenge us all to reconsider what is characterized as disability.

References

[1] de Graaf G, Buckley F, Skotko B. Estimation of the number of people with Down syndrome in Europe. Eur J Hum Genet; 2021.

[2] We Need a Law;. [Cited 2022 July 20]. Available from: https://weneedalaw.ca/wp-content/uploads/2020/10/WNAL-PositionPaper2020-FetalAbnormalitites.pdf.

[3] Zhang S. The last children of Down syndrome. The Atlantic [Internet]; 2020. [Cited 2021 Jul 27]. Available from: https://www.theatlantic.com/magazine/archive/2020/12/the-last-children-of-down-syndrome/616928/.

[4] Kaposy C. Choosing Down syndrome: Ethics and new prenatal testing technologies. Cambridge, MA; 2018.

[5] Wasserman D, Asch A. The uncertain rationale for prenatal disability screening. AMA J Ethics; 2006.

[6] Gillam L. Prenatal diagnosis and discrimination against the disabled. J Med Ethics; 1999.

[7] Kubler-Ross E. On death and dying: What the dying have to teach doctors, nurses, clergy and their own families. New York, NY: Routledge: J Med Ethics; 1969.

[8] Gallagher P, Fialka J, Rhodes C, Arceneaux C. Working with families: Rethinking denial. Young Except Child; 2002.

[9] Kerney P, Griffin T. Between joy and sorrow: being a parent of a child with developmental disability. J Adv Nurs; 2001.

[10] United Nations Department of Economic and Social Affairs: Disability. Convention on the Rights of Persons with Disabilities [Internet]. United Nations;.

[11] Lou S, Jensen S, Peterson O, et al.. Parental response to severe or lethal prenatal diagnosis: a systematic review of qualitative studies. Prenat Diagn;.

[12] Goff BSN, Springer N, Foote LC, et al.. Receiving the initial Down syndrome diagnosis: A comparison of prenatal and postnatal parent group experiences. Intellect Dev Disabil;.

[13] Ashtiani S, Makela N, P Carrion JA. Parents' experiences of receiving their child's genetic diagnosis: a qualitative study to inform clinical genetics practice. Waltham, MA: Am J Med Genet A; 2014. [Cited 2022 Jun 5]. Available from: https://www.uptodate.com.

[14] Lajka A, Quinones J. "What kind of society do you want to live in?": Inside the country where down syndrome is disappearing. CBS News [Internet]; 2017.

[15] Goering S. Rethinking disability: the social model of disability and chronic disease. Curr Rev Musculoskelet Med; 2015.

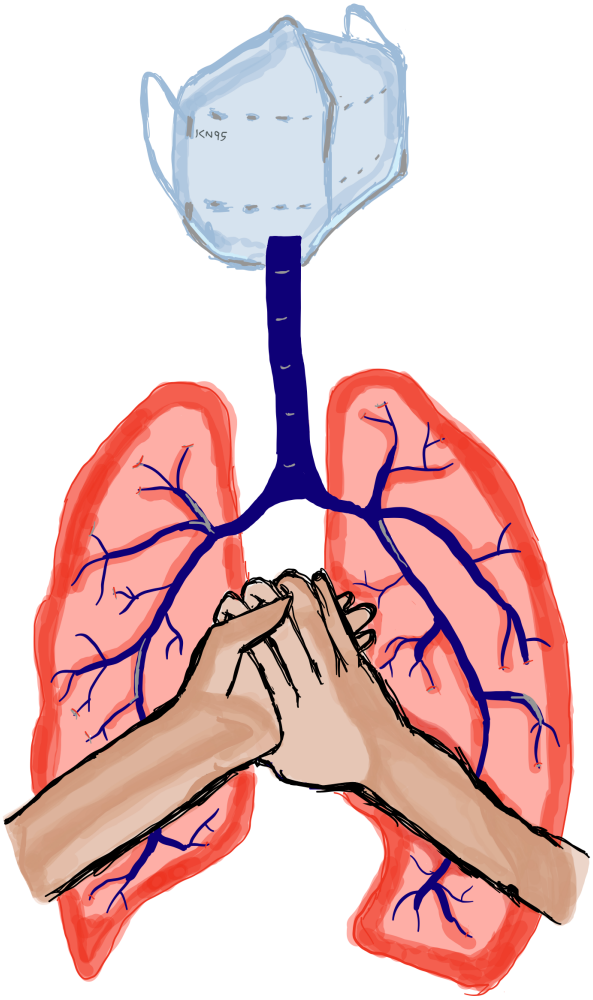
[16] Canadian Down Syndrome Society. About Down syndrome [Internet]. Canadian Down Syndrome Society;. Available from: https://cdss.ca/resources/general-information/.

[17] World Health Organization and The World Bank. World Health Organization; 2011. Available from: https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/world-report-on-disability.

[18] Carlson L, Kittay EF. Introduction: Rethinking philosophical presumptions in light of cognitive disability. Metaphilosophy; 2009.

When breath becomes a collective effort

Harman Vats BSc[†]



We all went through some very challenging times during the COVID-19 pandemic. However, it was through collective effort that we overcame those challenges. Whether it was stepping up to deliver groceries to our neighbours, advocating for accessibility, getting vaccinated, or simply wearing a mask, together we did so much. This sketch is to celebrate unity and altruism in the face of adversity.

[*]Correspondence to: vatsh@myumanitoba.ca
[†]Max Rady College of Medicine, University of Manitoba

Prostate cancer clinical presentation and differentiation from prostatitis: a brief radiological overview

Karam Al-Bayati BSc, BSc (Pharm)*†

Abstract

Correctly diagnosing prostatitis or prostate cancer can be particularly difficult even for the most experienced clinician, especially in the case of recurrent prostate cancer. Prostate-specific antigen (PSA), which is not typically ordered in the initial assessment of prostatitis, lacks specificity and is mostly used as a general screening tool. However, there are multiple imaging techniques in the radiologist's armamentarium that can aid in differentiating the two conditions. This review article aims to outline the current diagnostic guidelines for prostatitis and prostate cancer, highlight the imaging features which differentiate the two conditions, and perform a cost-benefit analysis of using advanced imaging techniques in prostate cancer screening.

Keywords: prostatitis, prostate cancer, PSMA PET, MRI, PI-RADS

Conflict of Interest Statement: The author declares no conflict of interest.

Introduction

Prostatitis is inflammation of the prostate gland possibly through infection though in many cases the exact etiology is unknown. When caused by an infection, coliform pathogens such as *Escherichia coli* may enter through the urethra via the intraprostatic reflux. Prostatitis is generally divided into four types. Type 1, also known as acute bacterial prostatitis, is usually caused by ascending urinary tract infection (UTI) or after transrectal prostate biopsy.[1] Those with recurrent UTIs or persistent infection lasting more than three months may fall under chronic bacterial prostatitis or type 2. Chronic prostatitis/chronic pelvic pain syndrome, type 3 or prostatodynia, may be caused by reflux of urine within the prostate among other causes. It is also the most common type of prostatitis. Those diagnosed with type 3 prostatitis require the physician to utilize the UPOINT approach to individualize treatment. It stands for the following six domains: urinary symptoms, psychosocial dysfunction, organ-specific findings, infection, neurologic, and tenderness of the muscles.[2] Discussion about the UPOINT approach is beyond the scope of this paper. Lastly, asymptomatic inflammatory prostatitis or type 4 is largely found incidentally through undergoing evaluation for other indications such as seminal analysis for infertility or on prostate biopsy.[3]

Chronic bacterial prostatitis affects mainly young and older-aged men in a bimodal distribution pattern.[4] Individuals with diabetes, smoking history, or previous urinary tract procedures/instrumentation are at an increased risk. Specifically, men with anatomical structural abnormalities such as benign prostatic hyperplasia (BPH) or prostate cancer may be more likely to present with prostatitis. In terms of presentation, acute bacterial prostatitis patients typically present with fever, dysuria, pelvic/lower back pain, and/or prostatic tenderness and swelling.[5] Those with chronic bacterial prostatitis usually have a history of recurrent UTIs. Patients may also complain of pain with ejaculation and sexual dysfunction. Pyuria and bacteriuria on urinalysis may be diagnostically useful if there are higher bacterial counts in the prostatic fluid compared to the urine but are seldom seen.

On the other hand, prostate cancer (PCa), which mainly consists of prostatic adenocarcinoma, is one of the most common cancers in men. It usually arises in the peripheral zone of the prostate. Most patients are brought to clinical attention due to PSA screening which tends to be elevated in both PCa and a number of other conditions complicating the picture. Diagnoses is primarily done via transrectal ultrasound-guided biopsy after suspicious digital rectal exam (DRE) finding on the posterior/lateral surface of the prostate, or abnormal PSA levels.[6] In fact, transrectal ultrasound is sometimes used to evaluate tumors found on DRE. However, it has a low specificity and is thus not used

*Correspondence to: albayatk@myumanitoba.ca
†Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada

to guide the decision to biopsy.[7] Many clinicians at present use magnetic resonance imaging (MRI) to make that decision as it helps to characterize the primary tumor. In terms of staging, PCa is staged based on the Gleason grading system, which run between Grade 6 to 10 where 6 is low grade, 7 is intermediate, and anything above 8 is high grade. The latter was supplemented by the Epstein grading system with Grade Group 1 being favorable and Grade Group 5 being the most aggressive as in Grade Group 5 the specimen lacks gland formation.

Potential PCa symptoms, if any, are very nonspecific and may generally present similar to those of benign prostatic hyperplasia such as nocturia, urinary frequency, hesitancy, and dysuria. On the other hand, hematuria is generally associated with bladder cancer rather than PCa. Weight loss and bone pain develop as the disease progresses. However, most patients are asymptomatic especially in early disease. Age of >50 years old, family history, and high fat diet are the main risk factors. Moreover, certain ethnic groups such as Black Africans or Black Caribbeans are at a higher risk of prostate cancer.[8] Treatment options include active surveillance, radical prostatectomy, external beam radiation, brachytherapy, or androgen deprivation therapy, which is most often used for those with advanced disease.

According to the Canadian Cancer Registry database for the period of 2011–2015, approximately 74.4% of all prostate cancers were diagnosed at stages I and II. This indicates that cancer cases were detected early likely through ordering PSA levels in suspected patients in the initial workup. Only 8.6% of prostate cancers were diagnosed at stage IV.[9] Further, young males (aged 18 to 59 years old) had lower incidence rates across all stages with an age-specific incidence rate of 2.6 per 100,000 population at stage IV at diagnosis. This is compared to males aged 60–69 years old and 70–79 years old with an incidence rate of 33.9 and 64.1 per 100,000 population at stage IV, respectively. The latter finding is of no surprise as PCa is a disease of older men and as they grow older they tend to present with more advanced stages of the disease.

Prostate-Specific Antigen in the Context of Prostatitis and Cancer

Serum PSA tends to be elevated in all variants of prostatitis whether it is sterile or associated with active infection.[10] Hence, it is prudent not to order in these cases. In one randomized study, PSA returned to normal levels in approximately 50% of the patients following successful treatment.[11] Treatment generally includes using fluoroquinolones such as ciprofloxacin 500 mg po BID for 4–6 weeks. However, as mentioned above, PSA should not be ordered in the first place.

Normal PSA is <4.0 ng/mL but the actual value is inconclusive because no specified threshold to diagnose PCa was identified by studies.[12] In other words, a PSA level in the normal range for age does not by itself rule out PCa. Changes in PSA level over a period of time (i.e., PSA velocity) is a rather helpful clinical marker to monitor the likelihood of developing PCa.[13] Another clinical marker is PSA density. As a general rule of thumb, a prostate size to PSA level ratio (i.e., PSA density) of about 10:1 is normal.[14] For example, if the prostate size on ultrasound is 40cc, then a PSA of 4 ng/mL is normal. Yet another utility of measuring PSA is to determine the percentage of free or unbound PSA to total PSA ratio which tends to be low in PCa. This ratio can aid to distinguish PCa from BPH with one study claiming that a cutoff of ≤25% is more likely to be PCa than a benign condition.[15] However, an absolute percentage is controversial and its use is limited to certain scenarios.[16]

When a PSA cut-off of >4.0 ng/mL is used in screening for prostate cancer, approximately 70% of the biopsies come back negative.[17] However, of these negative biopsies, about 20–30% of the biopsied patients are false negatives and actually have cancer. These can be cancers of the anterior region of the prostate which are not biopsied as readily compared to the peripheral zone.[18] This illustrates the lack of reliability of using PSA and random biopsies to identify clinically significant cancers.[19] Therefore, multiparametric prostate magnetic resonance imaging (MP-MRI) using 3T scanner is now used in multiple centers to allow for closer examination of suspicious lesions. Moreover, using MRI-Ultrasound-fusion-guided biopsy which digitally overlays real-time ultrasound with MRI image slices allows for specific and accurately targeted biopsies. It also showed better detection for clinically significant prostate cancers by targeting certain tumors in the anterior region of the prostate.[20] Recently, some centers began utilizing the transperineal biopsy approach instead of the transrectal approach as it reduces the infection risk and may have better sampling of the anterior prostate.[21]

Lastly, it is worth mentioning that although PSA as a screening test is controversial due to its inherent inaccuracies, its use to detect recurrence post treatment is beneficial. In fact, its utility as an accurate biomarker for post surgical or radiation treatment is well established to identify biochemical recurrence prior to the development of symptoms.[22] A rise of PSA of ≥0.2 ng/mL after radical prostatectomy or 2 ng/mL or more above the nadir after radiation therapy are both considered biochemical recurrence of PCa by definition.[23,24] Nonetheless, PSA doubling time is another important variable to follow especially post radiotherapy to identify recurrence. It has been reported that patients with a PSA doubling time of <3 months are at high risk of death.[25]

Prostate Imaging Reporting and Data System (PI-RADS)

PI-RADS classification was designed recently to standardize MRI acquisition and reporting in order to improve the localization and characterization of those sus-

pected of having PCa.[26] The most recent version (PI-RADSv2.1) was released in 2019 thanks to advancements in multiparametric MRI as a novel tool that combines anatomical and functional imaging. Functional imaging includes T2-weighted, apparent-diffusion coefficient, diffusion weighted, and dynamic contrast-enhanced images in order to obtain an optimal three-dimensional image of the prostate.[27] In simple terms, PCa appears homogeneously hypointense (dark) on T2-weighted MRI images and generally enhances on gadolinium. The lesion appears focal, round, irregular, and restricted compared to prostatitis, which generally appears wedge-shaped, diffuse, and band-like in morphology.[26] However, the distinction is not often clear. This led some clinical researchers to introduce quantitative analysis of multiparametric MRI using pharmacokinetic parameters to differentiate PCa and prostatitis objectively.[28] Another group of researchers used machine learning algorithms to further improve the PI-RADS scores assigned by the uroradiologists.[29] In general, PI-RADS scores greater than 3 are usually considered suspicious for clinically significant cancer.[19] A PI-RADS score of 1 indicate that clinically significant PCa is highly unlikely, unlike a score of 5, which indicates that PCa is highly likely. A clinically significant PCa in this case is defined histologically as Gleason score $\geq$7. Lastly, it should be noted that PI-RADS does not have a role in the detection of recurrent PCa nor any role in detecting progression after therapy.

Protein Specific Membrane Antigen Positron Emission Tomography (PSMA PET)

One recent advancement in the detection of PCa metastasis is PSMA PET. PSMA is a protein that is overexpressed in prostate cancer cells. Gallium-68 PSMA-11 (^{68}Ga-PSMA-11) is the molecule that is injected in the arm of the patient to specifically bind the tumor cells giving off detectable radioactivity as the gallium decays. PSMA PET offers a sensitivity of 85% and a specificity of 98% compared to conventional imaging with CT and bone scans. Moreover, radiation exposure is less by 10.9 millisieverts (mSv).[30] For perspective, this is the equivalent of around 100 fewer chest x-rays per year. In 2020, the Food and Drug Administration (FDA) approved the ^{68}Ga-PSMA-11 tracer to detect metastasis in men with PCa and also in those who were successfully treated for PCa but suspected of having a recurrence due to elevated PSA levels.[31] Previously, fluciclovine PET was the standard of care but had a moderate specificity and performance at low PSA levels.[32] It also had approximately a 3:1 tumor to background intake ratio versus 50:1 now with PSMA PET, making it much easier to localize the lesion than before. PSMA PET also has a superior inter-reader agreeability compared to fluciclovine.[33] This is especially important for PSMA+ patients with recurrences after radical prostatectomy who present with PSA levels <2.0 ng/mL. In these patients, a recent study by the department of Radiation Oncology at the University of California found that 38% of cases would be missed by standard radiation therapy had ^{68}Ga-PSMA-11 PET not been used to detect those lesions prior to therapy.[34] It is important to also note that, where ^{68}Ga-PSMA is used as a radiotracer, PET lesion detection rate is positively correlated with higher PSA levels (~52% for <1.0 ng/mL vs. 91% >2.0 ng/mL).[35] This is due to reasons that are beyond the scope of this article. In summary, the value of PSMA PET lies in the detection of metastasis with high specificity in early biochemical recurrence.

Cost Analysis

Discussing PCa diagnosis and screening is not complete without discussing the cost and impact on quality of life. The effectiveness of early detection in prostate cancer is still a matter of debate that continues to challenge the experienced clinician. The dilemma is that early detection with PSA is contributing to overdiagnosis and overtreatment in patients. Discussing patient values, life expectancy, and goals is particularly important for such clinical enigmas. In addition, clinical correlation and professional judgment are essential when evaluating the need to further workup the patient and pursuing a biopsy. This is due to the lack of agreement between studies in terms of modeling prostate cancer progression. Additionally, most of these studies failed to follow the recommended methods in estimating quality of life and accounting for adverse treatment effects on benefits of life years gained.[36] A recent study in Sweden that looked at Cochrane data found that although PCa screening using MRI and targeted-biopsy improved sensitivity and specificity, it was classified as a very high cost per quality-adjusted life-year (QALY).[37] Specifically, the study found that using MRI PI-RADS had the most favourable diagnostic accuracy and detection when compared to systematic Transrectal ultrasound-guided biopsy.[38] Another model suggested that an optimum screening strategy is to biopsy patient with PI-RADS score of $\geq$3 but not those with a score of <3.[39] They determined that this strategy will provide an incremental cost-effectiveness ratio (ICER) of $23,483 per QALY.

According to the recent National Comprehensive Cancer Network (NCCN) guidelines, regarding the use of PSMA PET to rule out metastatic disease, those in the very low or low risk group (defined as having PSA <10 ng/mL beside other features) require no imaging while anyone in the intermediate risk group or above requires imaging.[40] Currently, NCCN does not specify PSMA PET in their guidelines for recurrent PCa. However, some experts argue that PSMA PET should be included in the guidelines because PSMA PET can affect the management of more than 50% of the patients scanned by upstaging or downstaging the disease.[41] It should be noted that PSMA PET is not widely available in Canada.

Conclusion

Non-invasive and minimally invasive diagnostic methods such as imaging are becoming more appealing in modern medicine to increase patient convenience and satisfaction. However, the clinician needs to examine the diagnostic sensitivity and specificity of such interventions to reduce the burden of misdiagnosis and disease progression, especially in the case of cancer where biopsy is needed to establish the diagnosis. MRI PI-RADS classification system offers a more sensitive and specific diagnostic tool to differentiate PCa from its mimics and inform the need to biopsy. Further, with the recent development of PSMA PET, clinicians can elucidate the recurrence of PCa with better sensitivities. However, further studies in regard to the use of these tools in the management, investigation, and treatment of PCa along with their impact on the quality of life are needed.

Acknowledgment

The author would like to thank Dr. Saranchuk for his valuable feedback and guidance in reviewing the manuscript.

References

[1] Campeggi A, Ouzaid I, Xylinas E, Lesprit P, Hoznek A, Vordos D, et al. Acute bacterial prostatitis after transrectal ultrasound-guided prostate biopsy: Epidemiological, bacteria and treatment patterns from a 4-year prospective study. Int J Urol. 2014 Feb;21(2):152–5.

[2] Shoskes DA, Nickel JC. Classification and treatment of men with chronic prostatitis/chronic pelvic pain syndrome using the UPOINT system. World J Urol. 2013 Aug 16;31(4):755–60.

[3] Krieger JN, Lee SWH, Jeon J, Cheah PY, Liong ML, Riley D. Epidemiology of prostatitis. Int J Antimicrob Agents. 2008 Feb;31(SUPPL. 1):85–90.

[4] Davis NG, Silberman M. Bacterial Acute Prostatitis. StatPearls [Internet]; 2021. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459257/.

[5] Rothman JR, Jaffe WI. Prostatitis: Updates on diagnostic evaluation. Curr Urol Reports. 2008 Mar 26;8(4):301–6.

[6] Blumberg JM, Elkhoury FF, Gollapudi K. Blood in urine. Surg A Case Based Clin Rev. 2019 Oct 16;p. 607–15.

[7] Stamey TA. Making the most out of six systematic sextant biopsies. Urology. 1995 Jan;45(1):2–12.

[8] Graham J, Baker M, Macbeth F, Titshall V. Diagnosis and treatment of prostate cancer: Summary of NICE guidance. BMJ. 2008;336:610–2.

[9] Bryan S, Masoud H, Weir HK, Woods R, Lockwood G, Smith L, et al.. Health Reports Cancer in Canada: Stage at diagnosis;. [cited 2021 Dec 28]. Available from: www.statcan.gc.ca.

[10] Tchetgen MBN, Oesterling JE. The effect of prostatitis, urinary retention, ejaculation, and ambulation on the serum prostate-specific antigen concentration. Urol Clin North Am. 1997 May;24(2):283–91.

[11] Stopiglia RM, Ferreira U, Silva MM, Matheus WE, Denardi F, Reis LO. Prostate Specific Antigen Decrease and Prostate Cancer Diagnosis: Antibiotic Versus Placebo Prospective Randomized Clinical Trial. J Urol. 2010 Mar;183(3):940–5.

[12] Thompson IM, Pauler DK, Goodman PJ, Tangen CM, Lucia MS, Parnes HL, et al. Prevalence of Prostate Cancer among Men with a Prostate-Specific Antigen Level $\leq$4.0 ng per Milliliter. N Engl J Med. 2009 Oct 8;350(22):2239–46.

[13] Carter HB, Pearson JD, Metter EJ, Brant LJ, Fozard JL. Longitudinal Evaluation of Prostate-Specific Antigen Levels in Men With and Without Prostate Disease. JAMA. 1992 Apr 22;267(16):2215–20.

[14] Benson MC, Ihn Seong Whang, Pantuck A, Ring K, Kaplan SA, Olsson CA, et al. Prostate Specific Antigen Density: A Means of Distinguishing Benign Prostatic Hypertrophy and Prostate Cancer. J Urol. 1992;147(3 II):815–6.

[15] Catalona WJ, Partin AW, Slawin KM, Brawer MK, Flanigan RC, Patel A, et al. Use of the Percentage of Free Prostate-Specific Antigen to Enhance Differentiation of Prostate Cancer From Benign Prostatic Disease: A Prospective Multicenter Clinical Trial. JAMA. 1998 May 20;279(19):1542–7.

[16] Lee R, Localio AR, Armstrong K, Malkowicz SB, Schwartz JS. A meta-analysis of the performance characteristics of the free prostate-specific antigen test. Urology. 2006 Apr;67(4):762–8.

[17] Hoffman RM. clinical practice Screening for Prostate Cancer. N Engl J Med. 2011;365:2013–22.

[18] Werahera PN, Crawford ED, La Rosa FG, Torkko KC, Schulte B, Sullivan HT, et al. Anterior tumors of the prostate: Diagnosis and significance. Can J Urol. 2013 Oct;20(5):6897–906.

[19] Eklund M, Jäderling F, Discacciati A, Bergman M, Annerstedt M, Aly M, et al. MRI-Targeted or Standard Biopsy in Prostate Cancer Screening. N Engl J Med. 2021 Sep 2;385(10):908–20.

[20] Siddiqui MM, Rais-Bahrami S, Truong H, Stamatakis L, Vourganti S, Nix J, et al. Magnetic Resonance Imaging/Ultrasound–Fusion Biopsy Significantly Upgrades Prostate Cancer Versus Systematic 12-core Transrectal Ultrasound Biopsy. Eur Urol. 2013 Nov;64(5):713–9.

[21] Rai BP, Mayerhofer C, Somani BK, Kallidonis P, Nagele U, Tokas T. Magnetic Resonance Imaging/Ultrasound Fusion-guided Transperineal Versus Magnetic Resonance Imaging/Ultrasound Fusion-guided Transrectal Prostate Biopsy—A Systematic Review. Eur Urol Oncol. 2021 Dec;4(6):904–13.

[22] Tourinho-Barbosa RR, Srougi V, Nunes-Silva I, Baghdadi M, Rembeyo G, Eiffel SS, et al. Biochemical recurrence after radical prostatectomy: what does it mean? Int braz j urol. 2018 Jan;44(1):14–21.

[23] Roach M, Hanks G, Thames H, Schellhammer P, Shipley WU, Sokol GH, et al. Defining biochemical failure following radiotherapy with or without hormonal therapy in men with clinically localized prostate cancer: Recommendations of the RTOG-ASTRO Phoenix Consensus Conference. Int J Radiat Oncol Biol Phys. 2006 Jul 15;65(4):965–74.

[24] Cookson MS, Aus G, Burnett AL, Canby-Hagino ED, D'Amico AV, Dmochowski RR, et al. Variation in the Definition of Biochemical Recurrence in Patients Treated for Localized Prostate Cancer: The American Urological Association Prostate Guidelines for Localized Prostate Cancer Update Panel Report and Recommendations for a Standard in the Reporting of Surgical Outcomes. J Urol. 2007 Feb;177(2):540–5.

[25] Milecki P, Antczak A, Martenka P, Kwias Z. What is the possible role of PSA doubling time (PSADT) and PSA velocity (PSAV) in the decision-making process to initiate salvage radiotherapy following radical prostatectomy in patients with prostate cancer? Cent Eur J Urol. 2011;64(2):67.

[26] American College of Radiology. PI-RADS TM Prostate Imaging-Reporting and Data System 2015 version 2 (full text document) [Internet]; 2015. [cited 2022 Apr 6]. Available from: https://www.acr.org/-/media/ACR/Files/RADS/Pi-RADS/PIRADS-V2.pdf?la=en.

[27] Nagel KNA, Schouten MG, Hambrock T, Litjen sGJS, Hoeks CMA, Ten Haken B, et al. Differentiation of prostatitis and prostate cancer by using diffusion-weighted MR imaging and MR-guided biopsy at 3 T. Radiology. 2013 Apr;267(1):164–72.

[28] Uysal A, Karaosmanoğlu AD, Karcaaltıncaba M, Akata D, Akdogan B, Baydar DE, et al. Prostatitis, the Great Mimicker of Prostate Cancer: Can We Differentiate Them Quantitatively With Multiparametric MRI? Am J Roentgenol. 2020 Sep 9;215(5):1104–12.

[29] Bardis MD, Houshyar R, Chang PD, Ushinsky A, Glavis-Bloom J, Chahine C, et al. Applications of Artificial Intelligence to Prostate Multiparametric MRI (mpMRI): Current and Emerging Trends. Cancers (Basel). 2020 May 11;12(5):1204.

[30] Hofman MS, Lawrentschuk N, Francis RJ, Tang C, Vela I, Thomas P, et al. Prostate-specific membrane antigen PET-CT in patients with high-risk prostate cancer before curative-intent surgery or radiotherapy (proPSMA): a prospective, randomised, multicentre study. Lancet. 2020 Apr 11;395(10231):1208–16.

[31] FDA Approves First PSMA-Targeted PET Imaging Drug for Men with Prostate Cancer — FDA [Internet]. Food and Drug Administration; 2020. [cited 2022 May 10]. Available from: https://www.fda.gov/news-events/press-announcements/fda-approves-first-psma-targeted-pet-imaging-drug-men-prostate-cancer.

[32] Tanaka T, Yang M, Froemming AT, Bryce AH, Inai R, Kanazawa S, et al. Current imaging techniques for and imaging spectrum of prostate cancer recurrence and metastasis: A pictorial review. Radiographics. 2020 May;40(3):709–26.

[33] Calais J, Ceci F, Eiber M, Hope TA, Hofman MS, Rischpler C, et al. 18F-fluciclovine PET-CT and 68Ga-PSMA-11 PET-CT in patients with early biochemical recurrence after prostatectomy: a prospective, single-centre, single-arm, comparative imaging trial. Lancet Oncol. 2019 Sep;20(9):1286–94.

[34] Boreta L, Gadzinski AJ, Wu SY, Xu M, Greene K, Quanstrom K, et al. Location of Recurrence by Gallium-68 PSMA-11 PET Scan in Prostate Cancer Patients Eligible for Salvage Radiotherapy. Urology. 2019 Jul;129:165–71.

[35] Evans JD, Jethwa KR, Ost P, Williams S, Kwon ED, Lowe VJ, et al. Prostate cancer–specific PET radiotracers: A review on the clinical utility in recurrent disease. Pract Radiat Oncol. 2018 Jan;8(1):28–39.

[36] Sanghera S, Coast J, Martin RM, Donovan JL, Mohiuddin S. Cost-effectiveness of prostate cancer screening: A systematic review of

decision-analytical models. BMC Cancer. 2018 Jan 18;18(1):1–15.

[37] Hao S, Karlsson A, Heintz E, Elfström KM, Nordström T, Clements M. Cost-Effectiveness of Magnetic Resonance Imaging in Prostate Cancer Screening: A Microsimulation Study. Value Heal. 2021 Dec;24(12):1763–72.

[38] H DFJ, Osses DF, Nieboer D, Steyerberg EW, Bangma CH, Roobol MJ, et al. Prostate MRI, with or without MRI-targeted biopsy, and systematic biopsy for detecting prostate cancer. Cochrane Database Syst Rev [Internet]. 2019 Apr 25;(4). Available from: https://doi.wiley.com/10.1002/14651858.CD012663.pub2.

[39] Barnett CL, Davenport MS, Montgomery JS, Wei JT, Montie JE, Denton BT. Cost-effectiveness of magnetic resonance imaging and targeted fusion biopsy for early detection of prostate cancer. BJU Int [Internet]. 2018 Jul;122(1):50–8. [cited 2022 May 16]. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/bju.14151.

[40] National Comprehensive Cancer Network. Prostate Cancer Version 2.2022 [Internet]; 2022. Available from: https://www.nccn.org/professionals/physician_gls/pdf/prostate.pdf.

[41] Sonni I, Eiber M, Fendler WP, Alano RM, Vangala SS, Kishan AU, et al. Impact of 68Ga-PSMA-11 PET/CT on Staging and Management of Prostate Cancer Patients in Various Clinical Settings: A Prospective Single-Center Study. J Nucl Med. 2020 Aug;61(8):1153–60.

Importance of symptom–rhythm correlation in patients with arrhythmias: lessons for first year medical students in primary care settings

Luke W. Sirant MSc[†]

Abstract

In primary care settings, cardiac arrhythmias can prove difficult in their diagnosis and management because many patients present with symptoms that are variable, transient, and nonspecific. Developing an approach to the recognition, diagnosis, and management of arrythmias is an important learning experience for medical students early in their training. In this article, several lessons are highlighted through a case example of a 57-year-old male presenting to their primary care provider with pre-syncopal episodes, shortness of breath, and chest discomfort. The case focuses on the steps in the management of the patient's symptoms in a local emergency department, and eventually in a tertiary care facility where a permanent pacemaker was deemed necessary for symptom resolution. This case emphasizes important lessons for medical students related to the diagnosis and treatment of arrhythmias, which can be in turn, applied to a general approach to all medical conditions.

Keywords: cardiology, arrhythmia, primary care

Conflict of Interest Statement: None to declare.

Introduction

The diagnosis and management of arrhythmias can be challenging. In general, arrhythmias are defined as any rhythm that is not normal sinus rhythm with normal atrioventricular conduction.[1] They can manifest in various ways, including bradycardic arrhythmias (sinus bradycardia, sinus pause, sinus arrest, sinoatrial nodal exit block, and chronotropic incompetence), tachycardic arrhythmias (atrial fibrillation, atrial flutter, and supraventricular tachycardia), and mixed arrhythmias (tachycardia–bradycardia syndrome). Clinically, patients often present with nonspecific symptoms which may include light-headedness, syncope, palpitations, dyspnea, chest discomfort.[1] Additionally, abnormal electrocardiogram (ECG) tracings are commonly observed. Arrythmias are often found in older individuals with comorbidities and risk factors such as hypertension, higher body mass index, and prior cardiovascular events. Because symptoms can be variable, nonspecific, and often transient, in a primary care setting it can be difficult to connect the patient's symptoms to a specific rhythm disturbance. The challenge of arrhythmia diagnosis and treatment provides an excellent learning opportunity for medical students to gain experience in the process of assessing diseases that can present with non-specific symptoms, correlating patient symptoms with clinical signs, and the careful consideration of initial treatment and management options.

Case history

The following case is a 57-year-old male with a past medical history of hypertension and gastroesophageal reflux disease that presented to his primary care provider in July 2021 after a prescynopal episode that occurred while he was climbing a ladder. Luckily, he did not lose his balance and was able to safely descend after the episode passed. The patient had a known one-year history of recurrent presyncope that was being actively investigated. During these episodes, the patient would not lose consciousness but experience blurred vision, light-headedness, and occasionally, chest discomfort and dyspnea. He reported that these episodes tended to occur when he was feeling anxious or stressed but were unrelated to exertion.

[*]Correspondence to: sirantl@myumanitoba.ca
[†]Max Rady College of Medicine, University of Manitoba

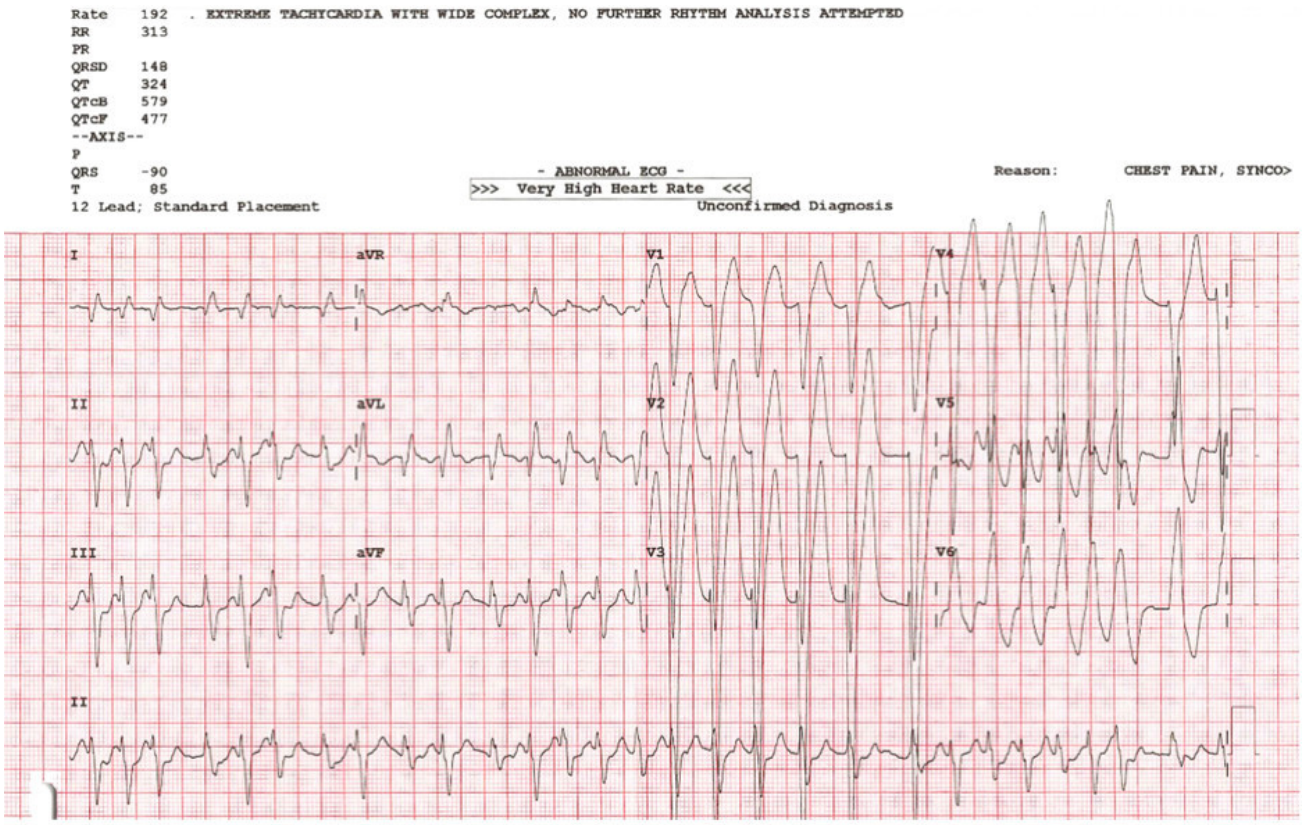


Figure 1. Initial ECG presenting wide complex tachycardia

Physical exam was unremarkable, including a normal heart rate and blood pressure measured in the primary care clinic, no abnormal heart sounds or murmurs, and no carotid bruit, or focal neurologic signs. However, the patient had also been monitoring his heart rate at home since symptom onset, and the monitor often reported an irregular pulse with bradycardia (typical readings ranging between 30–40 beats per minute [bpm]). These lower readings did not correlate to the patient's episodes of presyncope. Immediately after the pre-syncopal episodes, the patient's self-recorded heart rates ranged from 80–90 bpm.

The results of several prior investigations were available. An ECG performed in April 2021 showed left bundle branch block (LBBB). The patient was subsequently referred to a cardiologist and ultimately underwent myocardial perfusion imaging (MPI) to assess for ischemia. MPI showed a fixed perfusion defect in the septum and adjacent segments, normal ejection fraction, mild left ventricular enlargement, and no signs of ischemia. These findings are nonspecific in the context of a LBBB.

The primary care physician referred the patient for a same-day ECG due to the detection of atrial fibrillation using an event recorder (KardiaMobile EKG monitor [AliveCor Inc., San Francisco, CA, USA]) that was applied in the office. The initial ECG report showed a wide complex tachycardia with a ventricular rate of 200 bpm (Figure 1). The patient was sent to the local emergency department where a repeat ECG demonstrated sinus rhythm with LBBB and heart rate of 42–62 bpm (ECG unavailable). The patient's potassium was found to be elevated at 6.8 mmol/L (normal range: 3.5–5.0 mmol/L), and he was treated for hyperkalemia. After being shifted, he converted to atrial fibrillation at a rate of 123 bpm, He was successfully reverted into sinus bradycardia (29 bpm) after treatment with oral and intravenous metoprolol and diltiazem. At this time, the patient was diagnosed with sinus node dysfunction (SND) with tachycardia.

Due to the difficulties in managing the changes between bradycardia and tachycardia, the patient was transferred to a tertiary care center for further management. He was assessed by an electrophysiology team, and it was determined that a permanent pacemaker (PPM) was needed. The PPM was inserted during the same admission without complications. On follow-up with the primary care provider three weeks later, the patient reported no recurrence of prescynope.

Discussion

For medical students early in their training, this case highlights the difficulties associated with the diagnosis and management of conditions that present with symptoms that are nonspecific and transient. The first lesson highlighted in this case is the importance of a thorough investigation and workup to rule out life-threatening causes for the patient's presenting symptoms (i.e., for prescynope, myocardial ischemia, or stroke). After im-

mediate life-threatening causes have been ruled out, additional tests can be ordered to further explore the patient's symptoms. In the case example, ECG and MPI investigations were unable to fully explain the patient's symptoms. The inability to correlate patient symptoms with test results highlights the challenges in diagnosing cardiac arrhythmias, which can be transient. Regularly reassessing the patient as new information becomes available is important to arrive at an appropriate diagnosis.

The second lesson highlighted by this case is to consider medication side effects as potential causes of a patient's symptoms. The diagnosis of SND is normally due to age-related loss of sinoatrial node cells and atrial fibrosis;[2] however, it can also result from the use of pharmacological agents. Beta blockers, calcium channel blockers, digoxin, antiarrhythmic medications, and acetylcholinesterase inhibitors used in the treatment of Alzheimer's disease have all been shown to influence heart function.[3] Medical students need to be aware of the common drug interactions which can impact heart function. Early identification of reversible causes of diseases can lead to improved health of patients and there should be a high index of suspicion when addressing difficult diagnoses. The patient in the highlighted case was neither using any prescription medications linked to arrhythmias; however, the use of medications while in the local emergency department to correct the tachycardia may have played a role in the severe bradycardia that the patient experienced after the correction.

The third lesson that is highlighted by this case is the difficulty associated with treating the symptoms of an undiagnosed condition. This is especially difficult in the treatment of arrhythmias because treatment for one condition may make another worse. For example, the patient in the case example presented with alternating tachycardia and bradycardia. The highlighted case, PPM was the definitive treatment for the patient because of an inability to manage the condition with medications in the long-term.[4,5] Making sure to identify situations where typical treatment options might not be beneficial comes with experience, but it is important for medical students to begin to identify these potential situations – and know how to utilize available clinical resources—to develop an appropriate management plan. It is also important to know when to seek the help of subspecialists, or when a patient requires resources only available in a tertiary care setting.

Finally, the fourth lesson that this case highlights is the role of home monitoring equipment. Caution needs to be advised when relying on the accuracy of at home monitoring information as blood pressures and heart rates can vary depending on the time of day, circadian rhythms, and extrinsic factors that depend on the patient and equipment to accurately take the measurement.[6] The patient in the case example monitored their own blood pressure and heart rate at home using a commercial blood pressure monitor when they began experiencing their presyncopal episodes. Although the patient had a past medical history of hypertension, they had higher systolic blood pressures at home relative to those measured in their primary care clinic. This discrepancy caused the physician to consider a transient arrhythmia and prompted further investigation using as an event recorder. Although regular home monitoring of vitals cannot be relied upon for all patients, having this information available can be used to help provide additional context for health care providers.

Conclusion

The presented case emphasized the importance of establishing clear symptom–rhythm correlation to provide the proper management of a patient presenting with arrhythmias. First, it is important to rule out immediate life-threatening causes of the arrhythmia. Secondly, to consider the patient's past medical history including the effects of medications to identify any reversible causes of the patient's symptoms. Thirdly, there are difficulties that can come with the management of symptoms without a unifying diagnosis, and it is important to identify these situations while having alternative management strategies available if the initial treatment fails. Finally, incorporating information about a patient's home vital monitoring can be useful to provide hints into the next steps in the investigation. Although this information must be taken in context with the patient's clinical picture, it can provide additional guidance for healthcare providers. These are lessons that can be applied to all clinical encounters.

References

[1] Levy S, Olshansky B. Calkins H, editor. Arrhythmia management for the primary care clinician. Waltham, MA: UpToDate; 2021. [Cited 2022 Jun 5]. Available from: https://www.uptodate.com.

[2] Dobrzynski H, Boyett MR, Anderson RH. New insights into pacemaker activity. Circulation. 2007;115(14):1921–1932.

[3] Homoud MK. Post TW, editor. Sinus node dysfunction: Epidemiology, etiology, and natural history. Waltham, MA: UpToDate; 2020. [Cited 2021 Jul 27]. Available from: https://www.uptodate.com.

[4] Kusumoto FM, Schoenfeld MH, Barrett C, Edgerton JR, Ellenbogen KA, Gold MR, et al. 2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol. 2019;74(7):e51–156.

[5] Homoud MK. Post TW, editor. Sinus node dysfunction: Treatment. Waltham, MA:

UpToDate; 2022. [Cited 2022 Mar 11]. Available from: https://www.uptodate.com.

[6] Littler WA, Honour AJ, Carter RD, Sleight P. Sleep and blood pressure. Br Med J. 1975;3(5979):346–348.

By the sea

Monica Ghebrial BHSc*

Abstract

This short story is inspired by my grandmother's childhood during the 1940s cholera epidemic in rural Egypt. Despite hearing stories about the epidemic since my childhood, it was only through the current pandemic that my appreciation and understanding of the social and psychological impacts of that event started to take shape. I am humbled to have had the privilege to learn from and hear first-hand these stories from my grandmother, and I hope that through writing this story I am able to pass on her voice. My goal is to share this perspective and knowledge with the medical community. The story illustrates the lifelong and intergenerational impact of illness on the well-being of individuals, families, and society as a whole. Understanding this is especially important in light of the pandemic we are currently living through. I also hope that my story highlights the power of narrative in bringing healing in medicine and inspires others to share their own stories.

Keywords: pandemic, memory, consciousness, healing

We were both sitting by the seashore, under the watchful gaze of stars that crowned the night with whispers of stories untold. The waves gently kissed our feet, and the breeze thoughtfully embraced our words, carrying them to one another. My grandmother's eyes stared into the horizon, with depth that only decades of life and loss could hold. She carefully held my hands in hers, with a strength I didn't know she still had. I listened with all my might to the beautiful words that came next, hoping they would last as long as the waves of the sea rushed towards us...

She began with a time gone by, forgotten by many. It was the night her father came home from a long journey, shrouded in a long dark cloak that made him indistinguishable from the night. As soon as he opened the door, his five young children rushed towards him with an urgency only the deprivation of human connection and the innocent love of a child could create. His presence lifted the heavy weight of fear from the home, a fear that had shackled them for many weeks. My grandmother had already lost her little sister to the cholera outbreak earlier that year, which was a loss that was hushed by silence and comforted by grief. In the distance, they could hear the policemen coming around to each home to reinforce the curfew orders that had turned isolation into their daily companion.

In that moment the footsteps of the men outside echoed the heartbeat that my young grandmother could hear in her father's chest. In between the streams of tears that flowed down her beautiful brown eyes, she could see the flickering candle on the dining table that they lit every night in memory of her sister. A small reminder of the warmth that a loving young soul could create. A glimpse into a sea of memories that told the story of the life she once knew. The warmth of the candle radiated a hope she could almost touch. It seemed that, in her father's embrace, time had stopped, and the relentless fear of death had found its final resting place far from their home. In the whispers of the night, she fell asleep surrounded by an alien sense of comfort.

A novel feeling of hope washed over her as she realized that they were past the darkest part of the night that had claimed every moment of their existence for the last year. This knowledge came from within and filled her mind with a forgotten sense of peace that threatened the sadness that had long dominated her thoughts. With every passing day, this knowledge grew stronger inside her and she slowly broke free from the prison of uncertainty that had gripped her heart since her sister died. With every rising sunrise, the days grew longer, and the daily news of deaths around the village slowly started to fade away along with the relentless screams and cries of pain. As the winter of discontent gave way to a more hopeful spring, the true magnitude of what happened slowly started to take shape. The eyes of her brothers and remaining sister now carried an invisible scar that only came to life as tears in the night. And as the years moved along, the tears slowly dried, but the memory of their loving sister never went away. The warmth of the candle they lit in her memory never left their hearts...

In that moment, she looked again at me with her

*Max Rady College of Medicine, University of Manitoba

strong gaze, made only more powerful by the streams of tears that now engraved her face. She gripped my hand tighter and whispered that the journey of healing that she had started so long ago had not yet ended but had only just begun. Her beautiful strength and courage had paved the way for an even more meaningful journey of reflection and gratitude to be shared with generations to come. She still had gratitude for her sister who is gazing upon us from the stars above, making this powerful moment of connection last a lifetime. "We may never have all the answers for what has happened," she said, "but we do have the strength to honour those we lost, and that strength begins with first giving ourselves the time to grieve." At that moment, a calm breeze blew across the sea and wrapped us in a gentle embrace as the midnight rain started to descend, announcing its arrival to the silent night. The raindrops made a sombre dance as they descended upon the waters, mirroring the weight of the conversation they had witnessed. The sky was finally shedding its tears as it realized it could no longer hold them back.

And after a few long moments of gazing at the sea, she finally looked at me and said, "This too shall pass."