UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

Colegio de Ciencias de la Salud

A 23-year-old man with an intra-abdominal desmoid tumor: an interactive review

Análisis de caso

Miguel Francisco Andrade Egues

Medicina

Trabajo de titulación presentado como requisito
para la obtención del título de
Médico

Quito, 5 de diciembre de 2018

UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

COLEGIO DE CIENCIAS DE LA SALUD

HOJA DE CALIFICACIÓN
DE TRABAJO DE TITULACIÓN

A 23-year-old man with an intra-abdominal desmoid tumor: an interactive review

Miguel Francisco Andrade Egues

Calificación:

Nombre del profesor, Título académico Harry F. Dorn Arias, MD

Firma del profesor _____

Quito, 5 de diciembre de 2018

Derechos de Autor ®

Por medio del presente documento certifico que he leído todas las Políticas y Manuales de la Universidad San Francisco de Quito USFQ, incluyendo la Política de Propiedad Intelectual USFQ, y estoy de acuerdo con su contenido, por lo que los derechos de propiedad intelectual del presente trabajo quedan sujetos a lo dispuesto en esas Políticas.

Asimismo, autorizo a la USFQ para que realice la digitalización y publicación de este trabajo en el repositorio virtual, de conformidad a lo dispuesto en el Art. 144 de la Ley Orgánica de Educación Superior.

Firma del estudiante: _____

Nombres y apellidos: Miguel Francisco Andrade Egues

Código: 00110682

Cédula de Identidad: 1714554985

Lugar y fecha: Quito, 5 de diciembre de 2018

RESUMEN

Los tumores desmoides son entidades raras de rápido crecimiento. Se caracterizan por un bajo poder de metástasis pero tienen un índice alto de recurrencia. Los tumores desmoides poseen una gran variabilidad clínica. Esta discusión de caso trata sobre un adulto masculino de veintitrés años con diagnóstico de un tumor desmoide intra-abdominal. Los exámenes de sangre realizados fueron inconclusos, mientras que los exámenes de gabinete realizados demostraron una masa mesentérica. El diagnóstico diferencial se baso en dos problemas principales. Uno, síntomas del tracto urinario inferior y dos, el dolor abdominal. Se discuten dos vías moleculares, la vía de Wnt/Beta catenina y la vía del complejo de poliposis adenomatosa. Los tumores desmoides son incidentales que se desarrollan precipitosamente y que requieren supervisión constante una vez resecados. Este caso interactivo intenta explicar las posibles vías por las cuales surge la enfermedad y expone las dificultades y daros importantes al momento de realizar el diagnóstico.

Palabras clave: Tumor desmoide, síntomas del tracto urinario inferior, dolor abdominal, vía Wnt/Beta catenina, complejo de poliposis adenomatosa

ABSTRACT

Desmoid tumors are rare, rapidly growing, masses with minimal metastatic power and high rates of recurrence at the same location. Desmoid tumors have large clinical course variability. Treatment is a therapeutical challenge, because of its clinical variability. This is a case discussion of a previously healthy 23-year-old young adult with the diagnosis of a Desmoid Tumor. Laboratory tests where inconclusive, echography demonstrated a hipoechogenic solid mass. Computed Tomography reported an intra-mesenteric mass. The differential diagnosis had two major problems: lower urinary tract symptoms and abdominal pain There are two major molecular pathways described: 1. Wnt-Beta Catenin signaling pathway and 2. Adenomatous Polyposis Coli Complex. Desmoid tumors are incidental, precipitously developing neoplasms that require constant supervision. This discussion addresses important issues at the moment of diagnosis and treatment, and tries to explain the pathways through which the pathology arises.

Key Words: Desmoid Tumor, Lower Urinary Tract Symptoms, Abdominal Pain, Wnt/Catenin signaling pathway, Adenomatous Polyposis Coli Complex

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Desmoid tumors (DT's) are rare, rapidly growing, masses with minimal metastatic power and high rates of recurrence at the same location. (Ravi, Shreyaskumar , Chandrajit, & DeLaney) They represent 0.03% of all neoplasms and 3% of all soft tissue tumors and appear approximately in 3-5 million people of the global population. (Reitamo , Häyry , Nykyri , & Saxén). They have 2 types of presentations: one related to familial adenomatous polyposis (FAP) and another sporadic form. The more common presentation is the sporadic form, seen predominantly in females; during or after pregnancy. It is also related to stress; cesarean section, abdominal surgery or antecedent trauma (Nieuwenhuis, et al.), (Fallen , Wilson, Morlan, & Lindor), (Koskenvuo, et al.). The FAP related presentation, represent up to 15% of all DT's and affect 10-20% of people with the disease (Nieuwenhuis, et al.).

DT's have large clinical course variability, it is not unusual for patients to present with abysmally different growth rates, sudden periods of relapse or even spontaneous regression (Fiore, et al.), (Sagar , Möslein , & Dozois). Theoretically, DT's can grow along any fascia on the body, but al least 50% appear on the abdomen, the other half is divided mainly to the shoulder, chest wall and inguinal area (Gurbuz, et al.). Histologically DT's are monoclonal cells of fibroblasts, the periphery of the tumor is surrounded by fibroblasts and the core is made up of fibrosarcoma resembling cells (Maomi, Cordon-Cardo, Gerald, & Rosai). Most recently, molecular pathology of DT's has demonstrated a clonal chromosome anomaly, for both FAP and sporadic presentations. It is related to a damaged Wnt signaling pathway (Lazar, et al.), (Mullen, et al.).

The treatment for DT's sets a therapeutical challenge, because of its clinical variability. The plausible therapeutic scenarios are; observation, surgical resection and radiation therapy (Ballo, Zagars, Pollack , Pisters, & Pollock). Inevitably, the majority of patients with intra abdominal DT's are submitted to surgical resection (Ballo, Zagars, Pollack , Pisters, & Pollock). High recurrence rate call for periodic surveillance, standardized by the National Comprehensive Cancer Network.

CASE PRESENTATION

A previously healthy 23-year-old young adult, presented to the emergency room for inability to evacuate his bladder. The urinary symptoms had begun 3 days earlier with, what the patient described, as constant urinary urge and feeling unable to completely empty his bladder. The urinary symptoms where accompanied by chronic, intermittent and diffuse abdominal pain. The pain was located on the hypogastric region, with no irradiation. The patient denied any other additional symptoms, including nausea, vomit, diarrhea, constipation, fever, night sweats or bright red, white or darkened colored stools. Aside from the previously mentioned urinary symptoms the patient denied change in urine composition.

His familiar medical history included leukemia and gastric cancer (CA) from his maternal grandfather and paternal grandfather, correspondently. His past medical history exposed a previous dental procedure a year before and no known allergies. His social history was positive for alcohol on social occasions and tobacco; half a pack a day for 4 years. He did not use illicit drugs. His blood type was ORH (-). He was born and raised in Quito, Ecuador by both of his parents and his current occupation was a student.

Physical examination was later performed on the patient. His vital signs where: blood pressure of 131/71, cardiac frequency of 105, respiratory frequency of 22, oral temperature of 36.6 and an O^2 saturation of 93 with no additional oxygen. The physical examination founded dry oral mucosa, normal heart and breath sounds, a slightly distended abdomen, depressible, non tender, bowel sounds present abdomen. At hipogastrial level, a palpable mass was discovered. It measured 10 cm in diameter, was not mobile and had a solid consistency with regular borders. The mass could not be reduced, elicit pain with movement or cause skin inflammation or disruptions. The rest of physical examination remained normal.

The patient was admitted and summited to blood and imaging tests. The initial blood tests are shown on table (1). The patient was subject to an abdominal echography after hospitalization. The echography report described normal hepatic morphology with no biliary tree alterations. It described a normal appearing pancreas, spleen, large vessels and retroperitoneal space. The kidneys displayed symmetry, with no calculi or ectasia. At midline hipogastrial level the study discovered a hipoechogenic solid mass with measurements of 109 x 83 x 96 mm, encapsulated and well vascularized. The mass applied pressure over the apical portion of the vesicle but did not causes intraluminal abnormalities.

After the ultrasound report displayed a mass, a simple and contrast computed tomography (CT) scan where ordered for visualization and determination. The CT scan (Figures 1, 2, 3) reported an intra-mesenteric mass that measured 12 x 12 x 9 cm that was occupying the inferior part of the abdominal cavity and a portion of the pelvic cavity. The mass was oval shaped with well-defined, smooth borders. The mass had a mild capacity for contrast absorption and performed a grave mass effect across the abdominal structures,

including: compression of intestinal loops, ingurgitation of mesogastric vessels and compression of the vesicle dome.

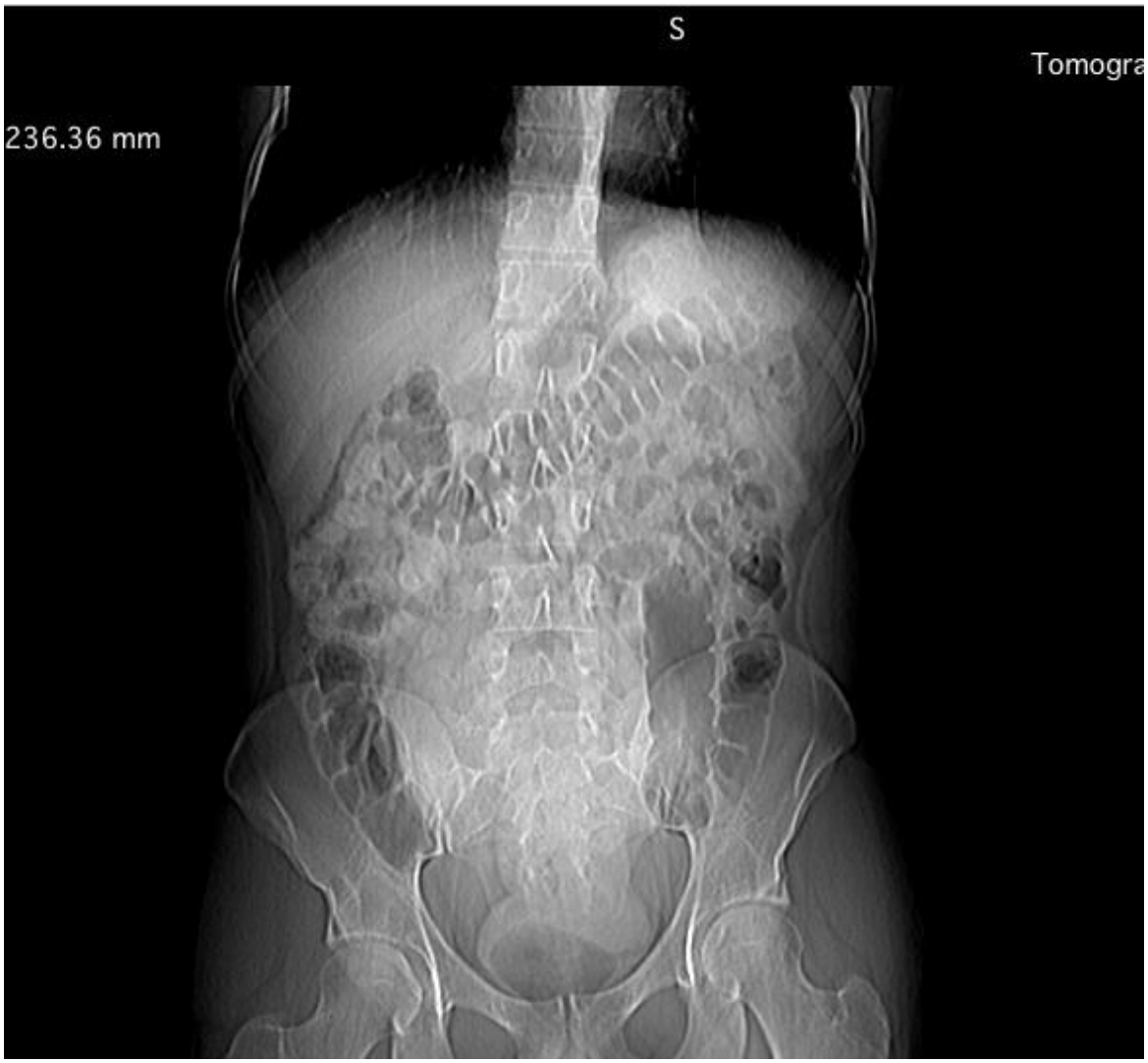

Figure 1. Abdominal CT scan

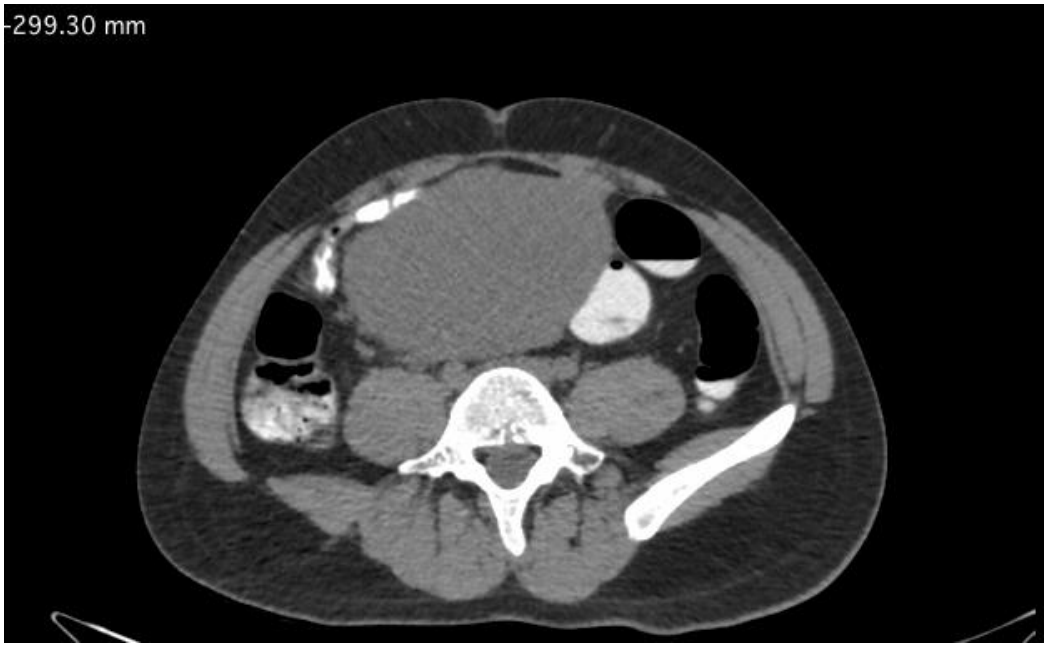

Figure 2. Abdominal CT scan

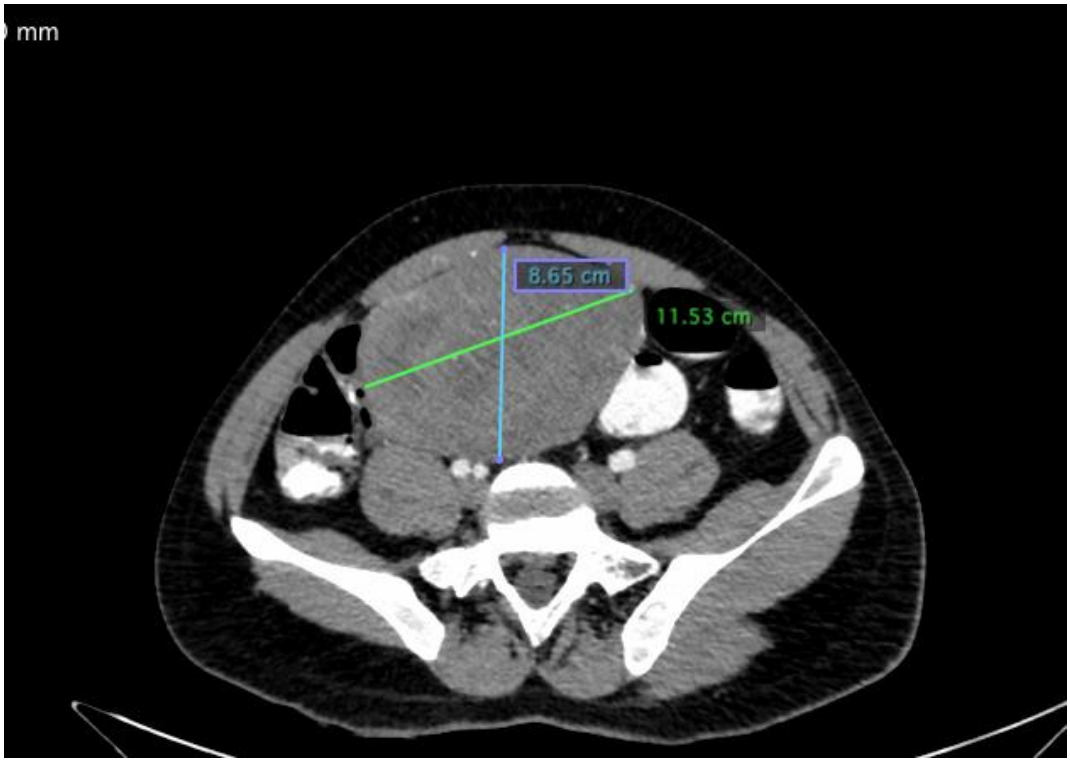

Figure 3. Abdominal CT scan

Additional laboratory and carcinogenic markers where taken. The laboratory results were inconclusive (Table 1), with no serum marker narrowing plausible pathologies.

An exploratory laparotomy was scheduled. The surgery performed yielded a well-circumscribed mass with a diameter of approximately 12cm, vascularized, adhered to the lateral face of the terminal ileum and the right colon. There where no abnormal mesenteric lymphatic ganglia, bladder morphology, intraperitoneal liquid or hepatic lesions. The surgery did not present with major complications. The amount of blood loss quantified did not press an emerging risk and the mass was sent for pathological examination.

Pathologic studies of the extracted mass reported a desmoid-type fibromatosis. The mass was also summited for malignant screening. The nuclei of some tumor cells where positive for beta catenin staining. Pathology was negative for: actin, CD34, desmin, CD117.

Laboratory Data				
Blood				
	Reference Range	On Admission	Post Op	On Discharge
Hemoglobin (d/dL)	13.6-17.5	17	12.8	11.4
Hematocrit (%)	40 - 52	51.6	37.8	34.3
White Cell Count (per mm^3)	4400-11500	9950	13180	
Differential count (%)				
Neutrophils	50-70	58.4	73	
Lymphocytes	25-40	31.2	13.7	
Monocytes	2-10	9.8	13	
Eosinophils	2-4.5	0.3	0.0	
Basophils	0-1	0.2	0.1	
Platelet count (per mm^3)	150,000-400,000	390,000	322	
Sodium (meq/L)	132-146	134		
Potassium (meq/L)	3.7-5.4	4.7		
LDH (U/L)	313-618	420		
Blood Urea Nitrogen (mg/dL)	6-23	16		
Urea (mg/dL)	10-70	26.3	23.3	
Creatinine (mg/dL)	0.60-1.30	1.20	1.10	
Uric Acid (mg/dL)	3.50-8.50	5.20	6	
Amilase (U/L)	30-110	40		
Lipase (U/L)	23-300	27		
Alkaline phosphatase (U/L)	38-126			
AST (U/L)	9-50	25		
ALT (U/L)	15-59	37		
Total bilirubin (mg/dL)	0.20-1.30	1.0		
Direct bilirubin (mg/dL)	0.00-0-40	0.3		

INR	0.80-120	1.14		
TTP (seg)	23.4-36.2	34.9		
PCR (mg/dl)	0.00-10.00	7.00		
HIV		Non reactive		
Urine				
Color		Yellow		
pH		5.0		
Specific gravity		1.01		
Protein		Negative		
Glucose		Negative		
Ketones		Negative		
Blood		Negative		
Bilirubin		Negative		
Nitrite		Negative		
Leukocyte esterase		Negative		
Red cells		Negative		
Leukocytes		2-4 HPF		
Bacteria		Negative		
Casts		Negative		
Crystals		Negative		
Specific Malignant Markers				
B-HCG	<2.6 mUI/l	<0.01		
AFP	0.00- 7.00 ng/ml	5.66		
CEA	0.0-3.8 ng/ml	1.63		

Table 1. Laboratory data obtained during patient's hospitalization

DIFFERENTIAL DIAGNOSIS

The 23-year-old patient presented with two major problems at entry from which a differential diagnosis can be formulated: 1) urinary symptoms and 2) chronic abdominal pain.

Urinary tract symptoms

Urinary symptoms can have several etiologies. The etiology of the symptoms depends on which part of the urinary tract is affected. To determine the etiology, the symptoms can be divided in upper and lower urinary tract (McVary & Saini). High urinary tract symptoms comprehend the renal system and pre renal system mainly, whilst, the lower urinary tract comprehends the ureter, bladder and urethra. Lower urinary tract symptoms

(LUTS) are widely unspecific, but can be separated into 3 different categories; storage, voiding, post-micturition (Abrams, et al.). The different symptoms of each category are described in table No. 2. Each category upholds a different phase of urine flow through the LUT. The differentiation of each phase orients the physician into the structures involved. The patient did not exhibit any sign of upper urinary tract symptoms since the physical examination did not demonstrate upper urinary tract infection symptoms, plus the blood tests showed a normal creatinine level; 1.09mg/dl and normal blood urea level; 26mg/dl. The patient presented to the emergency room with LUTS, specifically: urinary urgency (storage LUT) and sensation of not being able of completely emptying the bladder (post-micturition LUT). Storage LUTS represent alterations with filling and emptying of the bladder. While post-micturition LUTS represent a problem with the action of urinating. Typically, these symptoms appear on the setting of an overactive balder, detrusor over activity or benign prostate enlargement (Abrams, Chapple , Khoury, Roehrborn, & de la Rosette), which the patient does not exhibit signs of. Urine analysis of the patient came back normal plus the CT scan and echography demonstrate a normal bladder with no signs of enlargement. The imaging tests describe an intra-abdominal mass that is in contact with the bladder. The mass is displacing the dome of the bladder, subsequently decreasing the bladder's capacity for expansion and proper contraction, eliciting the patient's emergent symptomatology. The patient did not present concordant symptoms for a tumor in the intraluminal bladder and given the age, epidemiology and negative laboratory tests, the diagnosis of bladder malignancy was unlikely.

Type of LUTS	Symptoms
Voiding: These are experienced during urine flow	Slow Stream
	Intermittent Stream
	Hesitancy

	Straining to void
	Terminal dribble
	Dysuria
Storage: These symptoms are felt during the storage phase and bladder filling.	Urgency
	Daytime Frequency
	Nocturia
	Incontinence
	Abnormal Bladder Sensation
Post-micturition: these symptoms occur after urination.	Incomplete emptying
	Post Micturition dribble

LUTS: Lower Urinary Tract Symptoms

Table 2. Types and categories of LUTS

Abdominal pain

Abdominal pain is a widely unspecific symptom. It can withhold severe chronic diseases, acute life threatening pathologies or benign transitory discomfort (Penner & Fishman), (Fleischer, Gardner, & Feldman) . The patient presented to the emergency room with chronic, diffuse, intermittent, lower abdomen located, non-irradiating pain. Lower abdominal pain suggests a direct interaction of the distal intestinal tract causing the pain, but it can also carry visceral pain from upper abdominal organs or pelvic structures (Penner & Fishman, 2017). Chronic and diffuse abdominal pain is associated with inflammatory diseases and malignancy (Penner & Fishman). Table 3 demonstrates the common associations between the different types of abdominal pain and its probable pathology. Since urinary tract pathology was discarded through physical examination and laboratory tests, the pain was pinpointing intestinal pathology. Hypogastric pain associated to gastrointestinal (GI) disease is commonly associated with appendicitis, diverticulitis, infectious colitis or

inflammatory bowel (Penner & Fishman). The physical examination was negative for fever, organ enlargement, augmented bowel sounds, ascites and tender points. Hepatic enzymes, bilirubin levels and hepatic dependent coagulation factors where with in reference ranges (Table 1), making the diagnosis of hepatic or biliary tree pathology uncommon. Pancreatic markers also did not show any disturbance, discarding pancreatic inflammation. Iron concentration, iron binding capacity, hemoglobin and hematocrit where all within reference values (Table 1), in addition to the absence of constitutional symptoms in the patient's anamnesis, discarded chronic inflammatory disease and impending malignancy. Serum quantification of malignancy markers resulted negative (Table 1). The patient's abdominal examination was only remarkable for a palpable mass in the midline lower abdomen.

The final analysis of the patient's symptoms can be achieved by suggesting that the LUTS symptoms and the abdominal pain where provoked by the expanding nature of the abdominal mass. The mass was causing visceral inflammation and pressing down on the vesical dome. The voiding and post micturition LUTS where provoked by two characteristics of the tumor: 1) The reduced expansive capacity of the bladder and 2) the continuous pressure exerted on nervous and muscular surfaces. The abdominal pain was elicited by visceral compression caused by the tumor contact with it. The patient was scheduled for exploratory laparotomy to excise the mass.

Pathology	Localization of Pain	Clinical Features
Appendicitis	RLQ	Periumbilical pain initially that radiates to the right lower quadrant. Associated with anorexia, nausea, and vomiting.
Diverticulitis	RLQ or LLQ	Pain usually constant and present for several days prior to presentation. May have associated nausea and vomiting.
Nephrolithiasis	Either	Pain most common symptom, varies from mild to severe. Generally flank pain, but may have back or abdominal pain.

Pyelonephritis	Either	Associated with dysuria, frequency, urgency, hematuria, fever, chills, flank pain, and costo-vertebral angle tenderness.
AUR	Suprapubic	Present with lower abdominal pain and discomfort; inability to urinate.
Cystitis	Suprapubic	Associated with dysuria, frequency, urgency, and hematuria.
Infectious colitis	Either	Diarrhea as the predominant symptom, but may also have associated abdominal pain, which may be severe.

AUR: Acute Urinary Retention, LLQ: Left Lower Quadrant, RLQ: Right Lower Quadrant

Table 3. Common association of lower abdominal pain and different pathologies

DIAGNOSIS AND TREATMENT

The diagnosis of DT's is exceptional. Typically, and given the epidemiological rarity of the tumor, DTs are not often suspected until pathological studies are performed (Ravi, Shreyaskumar , Chandrajit, & DeLaney). Since the patient's tumor was not specified, abdominal pain persisted and additional diagnostic tests could not be performed, exploratory surgery was the preferential method of diagnosis and treatment. According to Cusack and Overman, patients with confirmed intestinal tumor by image, assiduous diffuse abdominal pain and inconclusive blood serum laboratory should undergo surgery (Abbas , et al.). The surgery was performed under general anesthesia. It required a supraumbilical midline incision that ended in the pubic symphysis. After exploring the abdominal cavity, the surgeon resected a well-circumscribed mass with a diameter of approximately 12cm, vascularized and adhered to the lateral face of the terminal ileum and the right colon. The terminal ileum and 8 cm of the right colon where resected using auto-suture. Two mesenteric nodules where harvested for analysis. The ureter and bladder where located, examined and declared undamaged. Before closure, anastomosis between the small bowel distal end and the cecum

was performed, also utilizing auto-suture. Total time under surgery recorded, was 80 minutes long. Since the patient's serum inflammatory and malignancy markers where negative, the etiology of the tumor remained undisclosed until pathology and immunohistochemical studies where performed. The macroscopic analysis of the tumor sample yielded a 13 x 12 x 10 cm that where dependent of a 16cm of intestine. The surface of the tumor was colored white with yellow serous patches that gave the mass a fibro-mixoid appearance. In relation to the intestine, it grew beneath the mucosal layer and respected the visceral serous with no interference of the intestinal free margin. The surgical borders where clean. In respect to the microscopic description the pathologist described a mesenchymal neoplasm with undulated fascicles of fibroblastic cells. The cells displayed mild nuclear atypia and where accompanied by dense collagen fibers. There was no necrosis produced with in the tissue, the intestinal mucosa showed no alterations but the propia muscularis was infiltrated by the neoplasm. The lymphatic nodules harvested where of normal appearance. The immunohistochemic analysis demonstrated a nuclear stain with beta catenin. The complete pathological analysis diagnosed a desmoid type fibrous neoplasm.

PATHOLOGY

The pathology laboratory received three samples to analyze: the mass containing a segment of intestine and two mesenteric lymphatic nodules. The mesenteric lymphatic nodules where analyzed by both light microscopy and immunohistochemistry. Both nodules where negative for structural abnormalities, maintaining their physiological macroscopic and microscopic appearance. The citogenic staining of the nodules was also negative. As for the tumor, it had the physical and immunohistochemical appearance of a DT. Histology and immune staining of tumoral entities requires expertise and continuous update of techniques

(Aitken, et al.). Apart from light microscopy, the single definitive study to complete the diagnosis of DT's is immunohistochemical analysis. To differentiate the specimen from plausible fibrous masses, specific molecular processes are isolated. Appendix A, displays the common immunochemical staining performed in the differential diagnoses of fibrous appearing masses. Apart from the diagnosis, the identification of these specific processes provides information about the prognosis and behavior of the DT. Although not completely understood, there are two major molecular pathways described in DT's; Wnt-Beta Catenin signaling pathway and APC (Adenomatous Polyposis Coli) complex (Barker, 2008). In physiologic conditions, Beta-Catenin is a transcription factor. It interacts within mesenchymal cells to promote cellular proliferation. The APC complex regulates beta-catenin actions by phosphorylating the excess and signaling proteasome degradation with in the cell (Barker), (Lazar, Hajibashi, & Lev) (Aitken, et al.). Wnt signaling pathway is activated by an unknown ligand, the activated Wnt pathway inhibits the APC complex capacity to phosphorylate the excess beta-catenin. The excess beta-catenin results in nuclear translocation of the molecule and promotion of DNA transcription (Lazar, et al.) (Lazar, Hajibashi, & Lev). The promotion of gene transcription provokes an augment in cellular proliferation and improved cell survival. (Ravi, Shreyaskumar , Chandrajit, & DeLaney). APC complex is the most described alteration for DT appearance (Ravi, Shreyaskumar , Chandrajit, & DeLaney) (Lazar, Hajibashi, & Lev). It is well described in FAP and it appears in most cases of DT's (Ravi, Shreyaskumar , Chandrajit, & DeLaney) (Lazar, Hajibashi, & Lev) (Aitken, et al.). A defective APC protein results in accumulation of beta-catenin and posterior aiding of transcription. APC mutations occur predominantly in chromosome 5q, this provokes a premature stop codon of the genetic reading, resulting in a truncated gene product without performing capacity (Aitken, et al.). The patient's tumor

analysis was positive for beta catenin staining. It appeared mainly in the nuclei of various tumoral cells, providing a proper cellular diagnostic characteristic of a DT.

FOLLOW UP

The patient's post-operative status was stable. The general condition improved, with stable vital signs and normal mental status. Surgical site was closed, with no local or general signs of inflammation. Post-operation laboratory tests displayed an important reduction in hemoglobin and hematocrit (Table 1.0). The anemia encountered, was accounted to the surgical procedure and the amount of blood loss during the operation. Iron and maturation stimulants where not associated with the anemia. Patient was discharged three days after the operation. Since the anemia would resolve with proper diet and rest, and the patient presented proper vowel functions and no alarming signs or symptoms, he was discharged.

Total pathological and immunohistochemical analysis of the tumor took two weeks. The diagnosis of a DT required the patient to follow strict maintenance meetings with the physician and imaging tests. The patient returned a month after the operation for a follow up visit. A CT scan and lower digestive endoscopy was performed. CT scan demonstrated a normal appearing abdomen with no evidence of new masses. The lower endoscopy, revealed a normal appearing digestive system. The colonoscopy demonstrated no signs of polyps, inflammation, ulcers or damage to the luminal border through out the entire tract. Additionally, the patient's digestive tract was working properly. Motility displayed no alterations with normal bearing of diet and no history of diarrhea, weight loss or abdominal pain. The urinary symptoms disappeared completely. The patient was now able to empty his bladder and sustained no further sensation of voiding incapacity.

A plan was scheduled for a continuous long-term vigilance. According to National Comprehensive Cancer Network (NCCN), the patient is required to be scanned every six months for the first 3 years, then each year until year 6 and later every other year. The patient understood the nature of the tumor that was harvested and was determined to follow the periodic observance.

DISCUSSION

Desmoid tumors are incidental, precipitously developing neoplasms that require constant supervision (Reitamo , Häyry , Nykyri , & Saxén) (Reitamo , Häyry , Nykyri , & Saxén). Although not predominant in the population, DT's require specific patient and molecular investigation to encounter the pathology's' origin. After analyzing the patient's history and diagnosis, the case presented is an individualized, specific and rare entity that exemplifies the constant unpredictable nature of DT's (Ravi, Shreyaskumar , Chandrajit, & DeLaney). Although the patient's pathological and immunochemical studies reach diagnostic standards, the patient's family and traumatic history lack specific key events for the diagnosis. It also raises the necessity to discuss present day DT diagnostic tests, their value and future possibilities. Another characteristic of the pathology that must be discussed is the variable genetic composition in which the tumor arises; a proper identification of the population at risk must be addressed. In this case, the physicians encountered several problems along the way, for example, the patient's unspecific symptoms, which presented the doctors with the important challenge to pinpoint a specific disease. Another inconvenience encountered through out the process was the laboratory and imaging tests, which displayed a high specificity percentage but a low sensibility rate. The most time consuming problem, a raised, from the insufficient pathology instruments in the hospital, which demanded the

necessity for the specimen to be studied in the United States. The case presented also gave rise to future enhancements for the diagnosis and treatment, with a wide range of improvements in the diagnosis tests, molecular pathways to be studied and possible treatments to discover.

To continue, the variable presentation and characteristics of DT's make it a difficult diagnosis for any physician. A proper patient clinical and familial history could orient the physician and place a DT as a plausible diagnosis. Abdominal trauma, familial adenomatous polyposis and gestational age are all factors to consider and locate during patient history taking (Ravi, Shreyaskumar , Chandrajit, & DeLaney). The rapid growth and re growth rate of the tumor should also provide information to the physician. The patient in this study although, is a special case, since the patients history did not include any of the risk factors listed above.

Another issue to address is the diagnostic tests that can identify DT's. Since the etiology of the tumor is unknown, specific diagnostic tests are still unavailable to recognize DT's (Fiore, et al., 2009). As further research is performed on the pathways that allow the tumor to grow, a possible diagnostic marker for the diagnosis is beta catenin (Ravi, Shreyaskumar , Chandrajit, & DeLaney) (Aitken, et al.) (Lazar, Hajibashi, & Lev). The accumulation of this molecule inside the nucleus and cytoplasm of affected cells can be addressed in the future to properly identify DT. As for image test, the resemblance of DT and other neoplasms displays an almost impossible differentiation, especially when the DT's is intra abdominal (Abbas , et al.). Although echography is useful to diagnose DT's, it is mostly reserved to extra abdominal exploration, particularly the chest and abdominal wall. The

patient's tumor made it particularly difficult to differentiate and provided little information about the tumors etiology.

Additionally, genetics is a corner stone in the etiology of DTs. The amount of sporadic form of presentation gives rise for reasonable debate to an unidentified mutation. Although most cases of DT's are related to FAP, they only amount to a maximum of twenty percent of cases that are known to have a prior diagnosis of FAP. Specific individual chromosomal trisomys have been described, exclusively in chromosomes 8 and 20 that generate DTs (Aitken, et al.). Pediatric forms of DT's have been known to evade completely the adult Wnt/beta-catenin pathway, presenting with a solely specific pathway of their own.

The problems encountered during the patient's hospitalization where not major, but prolonged the definite diagnosis. The first problem encountered was the patient's widely unspecific symptoms. The urinary tract symptoms and the abdominal pain did not associate with a counter response. The patient presented no signs an affected organ system even less a systemic response. The proper exploration an identification of an abdominal mass was crucial to the diagnosis. Another problem that doctors encountered during the patients hospitalization, is the lack of laboratory variations. Blood work up and urinalysis of the patient where completely uneventful, making it a very difficult case to asses. Negative malignancy markers in the presence of an intra-mesenteric tumor where also compoundly uncommon. The most frustrating setback confronted was the hospital inability to perform a final diagnosis. The extracted tumor had to be transported outside the country for proper evaluation. The transportation of the specimen alone could have resulted catastrophic for the patient, exposing the only piece of study to a wide variety of variables.

For the future, a set of improvement could be made. For instance, and improvement in pathological studies inside the hospital. This can provide the patient and physician security and reduce the chances of misdiagnosis. Research, as for treatment and etiology, should be analyzed. The need for a specific pathway that produce the disequilibrium with in the neoplastic cells is needed to produce standardized laboratory tests. The patients tumor was intraabdominal and with no identifiable nature. Given the pathology's type and the lack of specific tests, exploratory laparotomy will remain the main source of diagnosis and treatment in cases like this.

REFERENCES

Abbas , A. E., Deschamps, C., Cassivi , S. D., Nichols, F. C., Allen , M. S., Schleck , C. D., & Pairolero , P. C. (2004, octubre). *Chest-wall desmoid tumors: results of surgical intervention.* Retrieved septiembre 10, 2018, from The Annals Of Thoracic Surgery: https://www.annalsthoracicsurgery.org/article/S0003-4975(04)00552-1/fulltext

Abrams, P., Cardozo, L., Fall, M., Griffiths, D., Rosier, P., Ulmsten, U., . . . Wein, A. (2003, enero). *The standardisation of terminology in lower urinary tract function: report from the standardisation sub-committee of the International Continence Society*. Retrieved septiembre 10, 2018, from UROLOGY: https://www.goldjournal.net/article/S0090-4295(02)02243-4/fulltext

Abrams, P., Chapple , C., Khoury, S., Roehrborn, C., & de la Rosette, J. (2008, abril). *Evaluation and Treatment of Lower Urinary Tract Symptoms in Older Men*. (American Urological Association) Retrieved septiembre 10, 2018, from The Journal Of Urology: https://www.jurology.com/article/S0022-5347(08)03290-4/fulltext

Aitken, S. J., Presneau, N., Kalimuthu, S., Dileo, P., Berisha, F., Tirabosco, R., . . . Flanagan, A. M. (2015, abril 3). *Next-generation sequencing is highly sensitive for the detection of beta-catenin mutations in desmoid-type fibromatoses*. Retrieved septiembre 10, 2018, from Virchows Archiv: https://link.springer.com/article/10.1007%2Fs00428-015-1765-0

Ballo, M. T., Zagars, G. K., Pollack , A., Pisters, P. W., & Pollock , R. A. (2016, septiembre 21). *Desmoid Tumor: Prognostic Factors and Outcome After Surgery, Radiation Therapy, or Combined Surgery and Radiation Therapy*. Retrieved septiembre 10, 2018, from Journal Of Clinical Oncology: http://ascopubs.org/doi/pdf/10.1200/JCO.1999.17.1.158

Barker, N. (2008). The Canonical Wnt/β-Catenin Signalling Pathway. In E. Vincan, & E. Vincan (Ed.), *Methods In Molecular Biology* (Vol. 468). Humana Press. Retrieved from Methods In Molecular Biology: https://link.springer.com/protocol/10.1007%2F978-1-59745-249-6_1

Fallen , T., Wilson, M., Morlan, B., & Lindor, N. (2006, Junio). *Desmoid tumors -- a characterization of patients seen at Mayo Clinic 1976-1999.* Retrieved septiembre 10, 2018, from Familial Cancer: https://link.springer.com/article/10.1007%2Fs10689-005-5959-5

Fiore, M., Rimareix, F., Mariani, L., Domont, J., Collini, P., Le Péchoux, C., . . . Bonvalot, S. (2009, julio 01). *Desmoid-Type Fibromatosis: A Front-Line Conservative Approach to Select Patients for Surgical Treatment*. Retrieved septiembre 10, 2018, from Annals Of Surgical Oncology: https://link.springer.com/article/10.1245%2Fs10434-009-0586-2

Fleischer, A. B., Gardner, E. F., & Feldman, S. R. (2001, marzo 1). *Are Patients' Chief Complaints Generally Specific to One Organ System?* Retrieved septiembre 10, 2018, from The American Journal of Managed Care: https://www.ajmc.com/journals/issue/2001/2001-03-vol7-n3/mar01-415p299-305

Gurbuz, A. K., Giardiello, F. M., Petersen, G. M., Krush, A. J., Offerhaus, G. J., Booker, S. V., . . . Hamilton, S. R. (1994, marzo 11). *Desmoid tumours in familial adenomatous polyposis*. Retrieved septiembre 10, 2018, from Gut/BMJ Journals: https://gut.bmj.com/content/35/3/377.long

Koskenvuo, L., Peltomäki, P., Renkonen-Sinisalo, L., Gylling, A., Nieminen, T., Ristimäki, A., & Lepistö, A. (2015, diciembre 10). *Desmoid tumor patients carry an elevated risk of familial adenomatous polyposis.* Retrieved septiembre 10, 2018, from Journal Of Surgical Oncology: https://onlinelibrary.wiley.com/doi/abs/10.1002/jso.24117

Lazar, A. J., Hajibashi, S., & Lev , D. (2009, julio). *Desmoid tumor: from surgical extirpation to molecular dissection*. Retrieved septiembre 10, 2018, from Ovid: https://insights.ovid.com/pubmed?pmid=19436199

Lazar, A. J., Tuvin, D., Hajibashi, S., Habeeb, S., Bolshakov, S., Mayordomo-Aranda, E., . . . Lev, D. (2008, noviembre). *Specific Mutations in the β-Catenin Gene (CTNNB1) Correlate with Local Recurrence in Sporadic Desmoid Tumors*. Retrieved septiembre 10, 2018, from The American Journal of Oncology: https://ajp.amjpathol.org/article/S0002-9440(10)61537-4/fulltext

Maomi, L., Cordon-Cardo, C., Gerald, W. L., & Rosai, J. (1996, septiembre). *Desmoid fibromatosis is a clonal process*. Retrieved septiembre 10, 2018, from ELSEVIER: https://www.sciencedirect.com/science/article/pii/S004681779690221X?via%3Dihub

McVary, K. T., & Saini, R. (2018, abril 3). *Lower urinary tract symptoms in men*. (M. P. O'Leary, Editor) Retrieved septiembre 10, 2018, from UpToDate: https://www.uptodate.com/contents/lower-urinary-tract-symptoms-in-men?search=urinary%20symptoms&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

Mullen, J. T., DeLaneyb, T. F., Rosenberg, A. E., Lec, L., Iafrate, A. J., Kobayashib, W., . . . Nielsen, G. P. (2012, noviembre 2012). *β-Catenin Mutation Status and Outcomes in Sporadic Desmoid Tumors*. Retrieved septiembre 10, 2018, from The Oncologist: http://theoncologist.alphamedpress.org/content/18/9/1043.long#aff-2

Nieuwenhuis, M. H., Lefevre, J. H., Bülow, S., Järvinen, H., Bertario, L., Kernéis, S., . . . Vasen , H. F. (2011, octubre 1). *Family History, Surgery, and APC Mutation Are Risk Factors for Desmoid Tumors in Familial Adenomatous Polyposis: An International Cohort Study*. Retrieved septiembre 10, 2018, from Wolters Kluwer: https://insights.ovid.com/pubmed?pmid=21904137

Nieuwenhuis, M., Casparie, M., Mathus-Vliegen, L., Dekkers, O., Hogendoorn , P., & Vasen, H. (2011, julio 11). *A nation-wide study comparing sporadic and familial adenomatous polyposis-related desmoid-type fibromatoses.* Retrieved septiembre 10, 2018, from PubMed: https://www.ncbi.nlm.nih.gov/pubmed?term=20830713

Penner, R. M., & Fishman, M. B. (2017, noviembre 2). *Evaluation of the adult with abdominal pain*. (A. D. Auerbach, & M. D. Aronson, Editors) Retrieved septiembre 10, 2018, from UpToDate: https://www.uptodate.com/contents/evaluation-of-the-adult-with-abdominal-pain?search=abdominal%20pain&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

Ravi, V., Shreyaskumar , P. R., Chandrajit, R. P., & DeLaney, T. F. (2017, febrero 24). *Desmoid tumors: Epidemiology, risk factors, molecular pathogenesis, clinical presentation, diagnosis, and local therapy*. Retrieved septiembre 10, 2018, from UpToDate: https://www.uptodate.com/contents/desmoid-tumors-epidemiology-risk-factors-molecular-pathogenesis-clinical-presentation-diagnosis-and-local-therapy?search=desmoid%20tumor&source=search_result&selectedTitle=1~50&usage_type=default&display_rank=1

Reitamo , J., Häyry , P., Nykyri , E., & Saxén , E. (1982, junio). *The desmoid tumor. I. Incidence, sex-, age- and anatomical distribution in the Finnish population.* . Retrieved septiembre 10, 2018, from PubMed: https://www.ncbi.nlm.nih.gov/pubmed?term=7091046

Sagar , P., Möslein , G., & Dozois, R. (1998, noviembre). *Management of desmoid tumors in patients after ileal pouch-anal anastomosis for familial adenomatous polyposis.* Retrieved septiembre 10, 2018, from PubMed: https://www.ncbi.nlm.nih.gov/pubmed?term=9823798

APPENDIX A: FIBROUS TUMOR IMMUNOHISTOCHEMICAL STAINING

	Immunohistochemical markers						Diagnostic molecular alterations
Tumor type	**STAT6**	**MDM2/ CDK4**	**MUC4**	**DOG1**	**Beta-catenin (nuclear)**	**TLE1**	
SFT	+	–	–	–	–	–/+	*NAB2-STAT6* fusion
Synovial sarcoma	–	–	–	–	–	+	*SS18* rearrangement
LGFMS	–	–	+	–	–	–	*FUS* rearrangement
WD/DDLPS	–/+	+	–	–	–	–	12q14~15 amplification
Fibromatosis	–	–	–	–	+	–	*CTNNB1* mutations
GIST	–	–	–	+	–	–	*KIT, PDGFRA* mutations

Retrieved form UpToDate 2018.