Medical Science Sample

Case Report

Acute Appendicitis Masquerading as Distal Intestinal Obstruction Syndrome in Adult

Cystic Fibrosis

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Overshadowed by Ssino-pulmonary infections, ceystic fFibrosis (CF) commonly affects gastrointestinal organs because of secretory and motility dysfunction. Infrequently, the resultingse changes can result incause dDistal iIntestinal Oobstruction sSyndrome (DIOS), an more and more increasingly diagnosed gastrointestinal conditionentity in adult Cystic FibrosisCF patients. We present thea case of a 22-year-old manle who presented to our hospital with right lower quadrant abdominal pain, with Despite the suspicion of acute appendicitis, the patient and was subsequently diagnosed as with DIOS. Our case highlights the importance of considering DIOS as a differential diagnosis of for right lower quadrant abdominal pain in CF patients, especially for by physicians working at community hospitals that which may not have a CEystic Fibrosis care program available.

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1. Introduction

Cystic Ffibrosis (CF) is a genetic disease of that affects multiple organs. With Because of advancementsing in the managementing of CF patients, patients can now often survive become to adulthoods [1]. However, the ilmproved life expectancy among adult CF patients has given riseled to an increase in extrapulmonary, notably gastrointestinal, man—ifestations, which did not happen—was previously uncommon Distal Lintestinal oObstruction Syndrome (DIOS) continues to be a rising complication in adult CF patients, presenting aswith acute abdominal pain like and mimicking an acute abdominal emergency.

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2. Case Report

A 22-year-old Turkish-origin manle with a past medical history of Cystic FibrosisCF presented with a one-day history of right lower quadrant abdominal pain. He described a sharp periumbilical pain that continued to worsen, which then shifted to the right lower quadrant of the abdomen. Prior to the onset of the abdominal pain, he reported experiencing nausea and anorexia for three days. His last bowel movement was two_

days prior to admission. Upon reviewing the patient's past history, it was noted that he had several episodes of pneumo—nia, for which he was appropriately treated with antibiotics. Nationally, no history of constipation or recurrent abdominal discomfort was reported prior to this. At home, the patient was prescribed aAlbuterol inhalationer as needed, dDornase aAlfa inhalationer, aAztreonam lysine nebulization, 500 mg aAzithromycin three times a week, LLansoprazole, LLumacaftor-ivacaftor twice a day, LLipase-protease-amylase capsule three times a day, and a multivitamin capsule once a day. The patient was also diagnosed with Cystic FibrosisCF at the age of four, and thehis disease progressed to exocrine pancreatics insufficiency, which was being treated with pancreatic enzymes. On abdominal examination, he was found to havehad diminished bowel sounds and tenderness on right lower quadrant with equivocal rebound tenderness on the right lower quadrant. Lab—oratory analysis showed leukocytosis (white blood cell count, WBC 13.0 mm/K3; nNeutrophils count, 62%) with a normal differential. He had no electrolyte imbalances. Computed tTomography—(CT) of the aAbdomen revealed thickening, and edema around the termi—nal ileum, inflammatory changes in the a colon—with inflammatory changes, free fluid in the right paracolic gutter adjacent to the cecum,—an appendix measuring 5.3×4.6 mm, and reactive lymph nodes (Figures 1 and 2).

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FIGURE 1: Axial abdominal computed tomographyCAT scan depicting thickening around the terminal ileum and colon (yYellow arrows) along with extralumi–nal fluid and reactive lymph nodes.

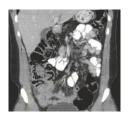


FIGURE 2: Coronal view<u>computed tomography scan with showing</u> thickening of the ileum with a distended appendix (yellow arrows).

measuring 5.34.6 mm, and reactive lymph nodes (Figures 1 and 2). Due to extraluminal fluid and cecal wall edema with inflammation, early acute appendicitis could not be excluded as a possible diagnosis. Surgical intervention was performed required, which revealed a ruptured microperforation of a cecal diverticulum and a distended appendix in chronic adhesions, for which he required an appendectomy and partial cecectomy with an intact ileocecal valve (IC valve) valve. Postoperatively, he was diagnosed with DIOS and was subsequently started on pPolyethylene gGlycol. The patient made an unremarkable recovery and was discharged home to be to be

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outpatient clinic without and did not have any recurrence of any symptoms.

3. Discussion

Distal Intestinal Obstruction Syndrome (DIOS₂) was previously ealled known as a Meconium Ileus_-equivalent in the past, described is characterized by the collection of viscid fecal material within the lumen combined with sticky mucoid intestinal content adherent to the intesti—nal wall of the terminal ileum and cecum [1]. Perez-Aguilar et al. reported that the prevalence of DIOS was 19.5% (mean age 20.6 years) among 46 CF patients in a retrospective analysis, while Dray et al. conducted a cross-sectional study reporteding a 15.8% (mean age 28.9 years) prevalence in among 171 CF patients in a cross-sectional study [2, 3]. Despite the Though there continues to be a limited assessment of on the prevalence of DIOS in adult CF_patients, DIOS is considered more common among adults compared tothan among children due to be cause of increased_disease progression.

Defective intestinal chloride and water secretions into the gut, luminal acidity, and loss of bile salt all contribute to the_

development of DIOS [1]. These patients characteristically present with right lower quadrant pain, nausea, abdominal distension, and failure to pass stools or flatus [1, 3]. In some patients, a palpable right lower quadrant mass can may be appreciated present that may be confirmed on abdominal radiographyX-ray [1]. Though abdominal X-rays are radiography is recommended to aid in the diagnosis of DIOS, they are it is inadequate in differentiating ileus from other causes of abdominal pathologies that may present in Cystic FibrosisCF patients [4]. Due to the proximity of the anatomical locationsproximity, as well as the overlapping clinical presentations, appendicitis and intussusception may mimic DIOS, which further leads to diagnostic uncertainty. Overlap of several intra-abdominal pathologies in CF increases the risk of misdiagnosis, especially with for acute appendicitis, as these patient's underlying pathologies may be masked in patients with pulmonary infections antibiotics [5, 6].

Osmotic laxatives are the cornerstone of bowel regimens for the treatment of DIOS. The most commonly prescribed <u>laxative</u> is <u>pPolyethylene Gglycol</u>. (<u>PEG</u>) administerrated at a dose of 20–40 ml/<u>k</u>Kg/hH, up twitho a maximum of 1 <u>lL/kg/h</u> for a total of 8 hours, <u>resulting in aachieving</u> fecal effluent consisting of clear fluid, along with <u>the</u> resolution of abdominal pain and constipation [1, 6]. If the diagnosis remains unclear, and thus, requires surgical intervention, <u>ICileocecal</u> valve resection should be considered to prevent the <u>development and</u> recurrence of intestinal obstruction sequalae-and growth, especially in adolescents [7].

With the increase in immigration of foreigners <u>intothrough</u> America, inner-city and community hospitals may not be <u>sufficiently</u> equipped with a <u>Cystic FibrosisCF</u> care center; <u>moreover, nor may</u> these hospitals <u>may not have</u> programs in provision, with expertise available to other clinicians involved in patient care.

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was unclear how immigration affected care centers' ability to manage patients. I have added this term to

make this association clearer.

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information (i.e. overlapping pathologies between appendicitis and DIOS leading to misdiagnosis). Therefore, please consider deleting this.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All authors contributed to the revision and approval of the manuscript.

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Life Sciences Sample

Case Report

Methylmalonic Acidemia with Novel MUT Gene Mutations

Inusha Panigrahi, Savita Bhunwal, Harish Varma, and Simranjeet Singh

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A 5-years_-old boy presented with recurrent episodes of fever, feeding problems,-and lethargy, fromsince the age of 11 months, and poor weight gain. He was admitted to our hospital and evaluated for metabolic disorders; subsequently, heeauses and-was diagnosed withes methylmalonic acidemia (MMA). He was treated with vitamin B12 and carnitine supplements and has been on-followed -up for the last 3 years. Mutation analysis by next generation sequencing (NGS), supplemented with Sanger sequencing, revealed two novel variants in exon 5 and exon 3 of the MUT gene responsible for the methylmalonic acidemia MMA in exon 5 and exon 3. Recently, he had developed dystonic movements including orofacial dyskinesia. With the advent of NGS, judicious use of NGS with Sanger sequencing can help identify causative and possibly pathogenic mutations.

1. Case Presentation

A 5-year-old The child boy presented for the first time at the age of 11 months, with complaints of fever, vomiting, poor feeding, and lethargy for the first time at the age of 11 months.- We observed that the patient he had pallor and tachypnea and was drowsy. Further evaluation was suggestedive of high anion-gap metabolic acidosis with ketonuria (urine ketones 3+) and with normal electrolytes, blood sugar (94 mg/dLl), vitamin B12, and homocysteine levels. Plasma ammonia and plasma lactate were was 118 units, and plasma lactate was 2.9 units, respectively. Transcranial magnetic stimulation TMS results wereas normal, but gas chromatography mass spectrometry analysis of but-urine_GCMS revealed elevated 3-OH propionic acid [12.39 retention time (RT)] as well as and elevated methyl malonic acid levels [16.92 RT, Suppl Figure 1, in Supplementary Material available online at https://doi.org/10.1155/2017/8984951]. Since then, the this child-patient was on a low-protein diet, and carnitine, biotin, thiamine, and vitamin B12 injections. The c hild was thereafter admitted to the hospital on seven multiple occasions (7 times) with acute decompensation and managed as per protocol. Mutational analysis was sent-for methylmalonic acidemia (MMA) which showed a single heterozygous missense variant c.976 A>G (p.Arg326Gly) in exon 5 of the MUT gene (genomic coordinates: chr 6: 49421405): as a variant of uncertain significance. Chromosomal microarray analysis done did not reveal any major deletion or duplication that which could disrupt the gene. Since exon 3 and exon 6 were not adequately covered by next generation sequencing (NGS), further evaluation by Sanger sequencing for targeted exons was performed done, and a second 2nd mutation in exon 3 c.753 G>A (p.=) was identified. The variants were predicted as found to be damaging by the on-SIFT database score (Suppl data) and as They were also predicted to be deleterious by on-Polyphen-2 and Mutation-Taster, but

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they were and absent not found in the ExAC database. Brain magnetic resonance image MRI brain of the patient (done atfrom the age of four4 years) was showeding multifocal cystic encephalomalacic changes with surrounding gliosis in deep white matter predominantly in frontoparietal regions (Figure 1). During In the latest admission of the patient to the hospital, we observed child was found to have fresh neurological findings in the form of perioral tremors, generalized hypertonia, and generalized dystonia with clonus with exaggerated deep tendon reflexes. The patient He was treated with intravenous dextrose and sodium bicarbonate and was continued on carnitine and injection of vitamin B12 injections. Plasma ammonia and plasma lactate were was 18 units and lactate level was 4.9 units, respectively. Brain magnetic resonance image MRI brain of the patientwas repeated and revealed bilateral basal ganglia hyperintensities, suggestive of metabolic stroke. After the subsidence of acute crisis, he was discharged on carnitine, injection of vitamin B12, injections, and trihexyphenidyl. His pParents were counseled regarding the prognosis and for prenatal diagnosis for next subsequent pregnancies.

2. Discussion

MMA presents with lethargy, acidosis, hypoglycemia/ hyperglycemia, ketosis, and recurrent episodes. MMA due to MUT gene mutations usually leads to severe phenotypes due to MUT gene mutations, and around 35–40% of cases are due to novelew mutations [1, 2]. There can be Mmissense or nonsense mutations, deletions, insertions, and so on in the MUT gene and so on can leading to a clinical phenotype.

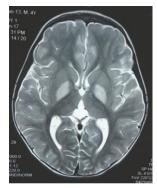


FIGURE FICURE—1: The Brain magnetic resonance image MRI brain—ofin -the -child -with MUT-related -methylmalonic acidemiaMMA showing -predominant -frontoparietal abnormalities -in -the form -of encephalomalacia and gliosis.

The advent of NGS technology has enabled better characterization of mutations in several populations. However, Sanger sequencing remains <u>a</u> useful adjunct in molecular testing <u>inof</u> these cases. It is required to find mutations when there is a strong clinical suspicion for them. Sometimes in NGS, due to because of incomplete coverage of the exons <u>by NGS</u>, Sanger sequencing is required to find mutations, if there is strong clinical suspicion. In this study, by using both the techniques By careful use of both techniques, we could found ind the two *MUT*

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variants responsible for-MMA in the patientthe clinical condition. In a Saudi study on 60 patients of MMA patients, nonsense, missense, and frameshift mutations were detected across the MUT gene [3]. Another study in 43 Chinese patients identified 8 recurrent mutations and 10 novel mutations [4]. A previous Indian study in 15 patients with of clinically diagnosed MMA identified one novel exon 12 mutation in the MUT gene with predicted pathogenicity. In this case Here, we identified two novel variants, one in exon 3 and another in exon 5 of the MUT gene. Both were labelled as variants of unknown significance (VUS). The exon 3 variant is a synonymous variant, and a different nucleotide change c.753 G>C (p.Lys251Asn) has been reported earlier in ClinVar. Some synonymous variants can also affect the splicing or protein function and lead to clinical phenotypes. The identified exon 5 variant is novelnew, but another close variant c.977 G>A (p.Arg326Lys) has been reported in ClinVar. The variants were found to be deleterious on bioinformatic analysis and were absent not found in the ExAC database. Both variants identified in the present case could possibly explain be responsible for the phenotype of MMA phenotype in the child. MUT-related MMA has poor prognosis in most cases. Specialized diet and supplements may not improve the outcomes, even if MMA is diagnosed early. Early recognition and appropriate treatment of acute crises are necessary. Metabolic stroke can sometimes occur in the absence of acute metabolic decompensation, so meticulous neurological examination at every each visit is useful. The treatment options for therapy include early liver transplantation [5] and possibly gene therapy in the future. Genetic counseling and prenatal diagnosis could help these families of the patients in making reproductive decisions.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

The authors would like to acknowledge Dhiti Omics Tech—nologies Pvt Ltd for help in mutation analysis.

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Physical Science Sample

Structural	Prediction	prediction	of	Bisbis(di-p-anisole)-1,4-azabutadiene
bis[triphenylphosp]	hine]ruthenium(II)	Uusing 31P NMR	Spectroscop	y spectroscopy

Author Details

Abstract1

The present paper reports the use of ³¹P NMR spectroscopy to predict the isomers structures—of [bis_4-methoxy-phenyl-[3-(4-methoxy-phenyl)-allylidene]-amino]-bis[triphenylphosphine]ruthenium(II), also known as bis(di-p-anisole)-1,4-azabutadiene-bis[triphenylphosphine]ruthenium(II), complexes. The complexation reaction was carried out using (di-p-anisole)-1,4-azabutadiene (compound 1), triphenylphosphine, and ruthenium chloride in 2:2:1 ratio under refluxing conditions of (di-p-anisole)-1,4-azabutadiene (compound 1), triphenylphosphine (PPh₃), and ruthenium chloride in the ratio of 2:2:1 for live 5 hhours. The formation of the In addition, ruthenium(II) complexes were was further confirmed by also characterized using FTIR and UV—Vis spectroscopicy—analyses to support the formation of ruthenium(II) complexes. The results of ³¹P NMR spectroscopy pie study on ruthenium(II) complexes suggested indicated the presence of that there are three isomers present after the complexation reaction.

Keywords

¹ NMR, nuclear magnetic resonance;

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• Corresponding author. Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and

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1. Introduction

Nuclear magnetic resonance (NMR) spectroscopy is an essential instrument analytical tool in the field of chemistry as it ean_helps determine_elucidate the structure of a molecule, identify_detect the presence of impurities in a sample, and determine the rates_of formation and as well as degradation of a compound. Even in 1970s_._NMR has was used as early as in the 1970s already been used to determine detect the cancer formation which and was identified to be offered a simple, fast, and low_cost method to_for this purpose identify cancer formation [1–3].

In As part of our long_term research interest on the synthesis of in ruthenium(II) complexes-synthesis, we used the (di-p-anisole)-1,4-azabutadiene (1) and triphenylphosphine (PPh₃) as the ligands to-for reaction react—with ruthenium trichloride under reflux conditions. _The resulting pProducts were formed, were eheeked analyzed by using 31P NMR spectroscopy, and the spectral observations results found in the spectra are worth to be discusseded in the present communication.

For Inorganic inorganic chemists commonly use, using of ³¹P NMR spectroscopy to identify the structure of a complex containing phosphine ligands is very common [4, 5]. ThFor example, this technique has been usede well-known examples is the use of ³¹P NMR spectroscopy to determine clucidate the mechanism of Wilkinson hydrogenation mechanism based on by identifying the coupling patterns among the phosphine ligands as well as those and also the coupling constants between the phosphine ligands as well as and the rhodium(I) metal centrecenter [6].

2. Methodology

The ruthenium complexes were characterized using UV_/Vis, FTIR, and ³¹P NMR spectroscopiesy. The IR spectra were recorded using on a Thermo Scientific Nicolet iS10 spectrophotometer in using KBr discs. The ¹H NMR spectrum for of compound 1 and ³¹P NMR spectrum for of the ruthenium(II) complexes were recorded using a JEOL JNM-ECA 500 spectrometer with TMS as an the internal standard. The absorption spectra waswere recorded with on a Jasco V-630 UV-Vis spectrophotometer.

2.1. To prepare Preparation of (4-Mmethoxy-phenyl)-[3-(4-methoxy-phenyl)-allylidene]-amine or (di-p-Aanisole)-1,4-azabutadiene (1).

4-Methoxycinnamaldehyde methoxycinnamaldehyde (1.62 g, 10.00 mmol) was dissolved in 10 mL of ethanol, and followed by the addition of 4-methoxyaniline (1.23 g, 10.00 mmol) which was then added to solution. The rReaction mixture was stirred and to obtain a resulted in green-yellow solid, which. The solid was filtered, washed with 5 mL of ethanol, and dried in vacuo. [The solid was purified by dissolving it in DCM and layered with hexane via slow diffusion. Yyield: 2.368 g (88.7%); IR (KBr, cm⁻¹).v: 3036 (C-H stretching), 1627 (C=N- stretching), 1601 (C=C stretching, aliphatic), 1575 and 1468 (C=C stretching, aromatic), and 1110 (OCH₃ stretching); HNMR (500 MHz, CDCl₃), β: 8.25 (d, 1H, Hz, -CH=N-), 7.47 (d, 2H, Hz₋), 7.18 (d, 2H, Hz₋), 7.05 (t, 1H, Hz, H-C₀), 6.99 (m, 1H, H-C_β), 6.90 (d, 4H, Hz₋), 3.83 (s, 3H, OCH₃), and 3.81 (s, 3H, OCH₃); UV—Vis (DCM, /nm): 273, 373; Anal. Calc. for C₁₇H₁₇O₂N (%): C, 76.38; H, 6.41; N, 5.24; Found (%): C, 76.75; H, 6.31; N, 5.05.

 $\label{thm:complex} \begin{tabular}{ll} \hline \textbf{To prepare 2.2. Preparation of } \hline \textbf{Bb} is 4-methoxy-phenyl-[3-(4-methoxy-phenyl)-allylidene]-amino}]-bis-[triphenylphosphineate] ruthenium(II) or <math display="block"> \hline \textbf{Bb} is (di-p-anisole)-1, 4-azabuta diene} -1, 4-azabuta diene$

RuCl₃·xH₂O (2.070 g, 1.0 mmol) and PPh₃ (0.525 g, 2.0 mmol) were added to a round—bottom flask containing 10 mL ethanol, and the mixture was then-refluxed. Compound 1 (0.316 g, 2.0 mmol) was then added to the round bottom-flask, and the mixture was refluxed again. The resulting pPale—maroon solids were wasformed, filtered and washed with hexane, and the p. Precipitate was dried *in vacuo*: IR (KBr, cm⁻¹) v: 3034 (C-H stretching), 1661 (C=N), 1576 (-merged IR band of for aliphatic and aromatic C=C stretching from aliphatic and aromatic), 1469 (C=C stretching of aromatic ring), and 654 (Ru-C), and 577 (Ru-N); -319 NMR (202.5 MHz, CDCl₃) \(\delta\); 49.7 (d, 1P, Hz), 47.4 (d, 1P, Hz), 41.7 (d, 1P, Hz), 39.7 (d, 1P, Hz), 35.1 (s, Ph₃P=O), and 29.9 (s, 1P); UV_-Vis (DCM) (): 321 and 382.

3. Results and Discussion

The Characterization of the ruthenium complexes were characterized was done using by UV-Vis, FTIR,

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and ³¹P NMR spectroscopyspectroscopies. The IR spectra was were recorded found on a by Thermo Scientific Nicolet iS10 spectrophotometer in using KBr discs. ¹H NMR spectrum for of compound 1 and ³¹P NMR spectrum spectra for the ruthenium(II) complexes were recorded on a obtained through JEOL JNM-ECA 500 spectrometer with TMS as an internal standard. The absorption spectra were recorded with on a Jasco V-630 UV-Vis spectrophotometer.

The ³¹P NMR spectrum of the ruthenium complexes (Fig. 1) shows appearance of two pairs of doublets and one singlet, indicating in the ³⁴P NMR spectrum for ruthenium complexes (Figure 1) indicate the presence of that there are three isomers (1:1:1 ratio) present induring the complexation reaction with the ratio of 1:1:1.

FigureFig. 1: ³¹P NMR spectrum for of ruthenium(II) complexes.

The singlet at 29.88 ppm reveals that the two PPh₃ units are magnetically equivalent in the ruthenium(II) complex. The In this case, the two PPh₃ units are either located at the axial position and are, which is trans to each other (FigureFig. 2(a)) [7], or located atin the equatorial plane, which is only trans only to either one of the C atoms from in the C=C bond or the N atom from in the N=C_bond (FigureFig. 2(b)).

FigureFig. 2: Postulated structures of (a) *trans*- and ((b) and (c)) *cis*-[bis(di-*p*-anisole)-1,4-azabutadiene}]-bis[triphenylphosphine]ruthenium(II).

Meanwhile, a The pair of doublets at 41.84 and 39.74 ppm with a -coupling constant of 21 Hz is assigned to a the cis_-isomer of the ruthenium(II) complex, as shown in FigureFig. 3(a). Lastly A, another pair of doublets at 49.80 and 47.36 ppm with a coupling constant of 38 Hz is assigned to a the trans_-ruthenium(II) complex (FigureFig. 3(b)). The difference in-coupling between the ruthenium(II) complexes in FigureFig. 3(a) and 3(b) is due to the positions of the PPh3 ligands. The smaller coupling constant of t, namely, 21 Hz is_, was assigned to the cis_-isomer because both the PPh3 ligands are in the equatorial plane. Fig. 3(a) shows The presence of doublets, which are for assignable to the PPh3 ligands in the complex is shown in Figure 3(a) because both the PPh3-ligands are trans to different atoms, that is, (nitrogen and carbon) atoms. For In the ruthenium(II) complex (as shown in FigureFig. 3(b)), the two PPh3 ligands are located at the axial position and are trans to each other. The Lastly, the single peak observed at 35.14 ppm is attributed to the presence of the triphenylphosphine oxide [8].

FigureFig. 3: Postulated structures of (a) *çis-* and (b) *trans-*[bis(di-*p-*anisole)-1,4-azabutadiene]}-bis[triphenylphosphine]ruthenium(II)}.

On the other hand, the The binding of compound 1 to the ruthenium(II) metal centrecenter is can be confirmed using FTIR and UV—Vis spectroscopicsy. Comparison of the IR spectra between of compound 1 and the ruthenium complexes (Figure Fig. 4) reveals that —the vibrations of C=N and C=C stretching bands bands are have been shifted after binding to the ruthenium(II) metal centrecenter. The For C=N stretching bands—it—shiftes from 1627 cm⁻¹ in the spectrum of compound 1 to 1661 cm⁻¹ in the spectrum of the ruthenium complex [9, 10]. In contrast, whereas the for C=C stretching, the IR band appears at 1601 cm⁻¹ in the spectrum of compound 1 but it—is not clearly shown detected in the spectrum of the complex because the IR bands of aliphatic and aromatic C=C bands for aliphatic and aromatic were mergeing into one a single broard IR band centred at 1576 cm⁻¹. Nevertheless, the two additional IR peaks are present at 577 and 654 cm⁻¹ in the finger-print region of the spectrum at 577 and 654 cm⁻¹ indicating confirm the formation of the respective Ru-N and Ru-C bonds [11].

FigureFig. 4: IR spectra of (a) compound 1 (a) and (b) ruthenium(II-) complexes (b).

The complexation of compound 1 to the ruthenium(II-) metal eentrecenter is can be further supported by the UV_-vVis data spectra as shown in FigureFig. 5. For In the case of compound 1, two absorption bands were are observed at 273 and 372 nm, which are assigned to the transition of the benzene ring and transition of thei-imine group [12], respectively. After the complexation, both absorption bands show significant shifts to 321 and 382 nm, respectively, demonstrating the Significant shifts of these two absorption bands have proven compound 1 was successfullly bound binding of 1 to the ruthenium(II) metal eentrecenter via the nitrogen atom from in the C=N group and the carbon atom from in the aliphatic C=C aliphatic group in of the C=C-C=N moiety.

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FigureFig. 5: UV_-Vis spectra of (a) compound 1 (a) and (b) ruthenium (II) complex (b).

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4. Conclusion

The Based on ³¹P NMR spectral evidence, we confirmed from ³⁺P NMR spectrum has shown the presence of three isomers of the bis(di-p-anisole)-1,4-azabutadiene}-bis[triphenylphosphine]ruthenium(II) complex in the 1:1:1 ratio of 1:1:1. In addition, the data from IR and UV—Vis spectral data revealed the successful binding of at compound 1 has bound to the ruthenium(II) metal centrecenter.

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